The Chemical Age

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Contents

NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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American and French Chemical Trade

Two interesting official reports have just been published—one dealing with commercial conditions in the United States, and the other with the same conditions in France during 1923. What is mainly interesting in each is the reference to the chemical and allied industries. In America most branches of these trades enjoyed very fair prosperity. The producers of paints and varnishes had sales and profits which broke all previous records, while the fertiliser industry emerged from a prolonged depression. Trade in coal tar products, however, was hampered by unstable prices in the home markets, and the report of an Anglo-German agreement caused some anxiety. There was no great fear of an invasion of the American market, but apprehension lest an arrangement between the B.D.C. and the I.G., with attendant interchange of secret manufacturing processes, might lead to such an increase of British manufacturing and German marketing efficiency as seriously to curtail the demand for American dyes in the Orient and South America. Potash production in the United States has declined rapidly since 1918, and with the exception of the Trona Corporation the only companies reporting production are those which recover the material as a by-product. The artificial silk industry continues to grow.

In France considerable progress is reported in the potash industry, in dyestuff production, and in the heavy chemical industries generally. An item of interest in connection with the fertiliser trade is M. Claude's belief that a fertiliser containing nitrogenous and potassic properties can be produced at less than the present ruling price. His experiments in the combination of synthetic ammonia and sylvinite are said to have resulted in an "ammoniaco-potassic chloride," which is described both as cheap and as immediately soluble. The same inventor is at work on the production of a cheaper form of phosphate. Industrial recovery in France, it is gratifying to hear, is steadily proceeding, and it is clear that French industrial scientists are hard at work on the improvement of old or the discovery of new processes.

The Future of By-Product Ammonia

IN view of what was said in these columns last week in connection with the possible effect on the market for ammonium compounds made from by-product ammonia of any large-scale development of the synthetic process, it is interesting to turn to some rather significant observations and correspondence on the subject which appears in *Chemical and Metallurgical Engineering*. From what appears in our American contemporary it is evident that by-product ammonia producers in the United States are fully alive to the difficulties with which they may be faced before many years are out; and, although by no means the same conditions prevail over here, it is instructive to follow up the American reasoning and the suggestions which are made for preserving the future of the market in by-product ammonia. Frankly, the American view is rather pessimistic. We are told that those who are in a position to form an accurate opinion are convinced that by-product ammonia producers who have hitherto been accustomed to dispose of their ammonia in the form of liquor must very soon take account of the rapidly decreasing demand for ammonia in this form. It is pointed out that there are several plants, either built or building, for making ammonia by synthetic processes, and as these plants will market liquid ammonia they will produce a corresponding decrease in the demand for the ammonia resulting from the carbonisation of coal.

Our contemporary states that the high cost of synthetic ammonia precludes for the present the rapid extension of these plants, but it feels that it is none too soon to start studying a problem which is sure to become serious within a comparatively few years. The main difference between conditions in this country and America would seem to be that in the latter country a very considerable proportion of

the total by-product ammonia produced is marketed as liquid ammonia. In this country, on the other hand, the quantity of liquid ammonia or concentrated ammoniacal liquor produced amounts to only some 10 per cent. of the total output of ammonia products. If, in fact, reference is made to the last annual report issued by the Chief Inspector under the Alkali Acts, it will be found that, out of a total quantity of 327,996 tons of ammonia products, only the equivalent of 32,780 tons was manufactured as concentrated liquor. The obvious remedy which is suggested by our contemporary, namely, that sulphate of ammonia should be generally made in lieu of ammonia liquor, scarcely applies to our own conditions.

Mr. J. S. Unger, in a letter to our contemporary, gives the opinion that, while in certain parts of America the by-product ammonia producer is already feeling the competition of the synthetic plants, the condition will only be temporary and that after a time the synthetic process will be driven out of the business. His contention is that in the past the by-product ammonia producers have allowed the refiners to control the price and market the ammonia, but the time has come for the producers to do their own refining and to convert their product to aqueous ammonia which they can market themselves. At least we can be grateful in this country that we are not hampered by dealing with auxiliary refiners or marketing agencies. The policy of the British manufacturers in converting their ammonia direct to sulphate, coupled with the watching brief which is held for them by the British Sulphate of Ammonia Federation, should be the surest safeguard against any difficulties such as seem likely to assail the American producers.

A Study in Dyestuffs History

INCLUDED in a miniature library of dyestuffs literature just issued by the British Dyestuffs Corporation—a branch of work which is being handled with excellent judgment—is an attractive little pamphlet which gives a short outline of the history of the industry in this country. Though what is said largely concerns the Corporation itself, there is much, both historical and critical, relating to the industry generally and well worth consideration for the lessons it enforces. The substance of the story is reproduced in this issue, and it is only necessary to emphasise a few points. Beginning with Perkin's discovery of "Mauve" in 1856, the synthetic dyestuffs industry in England made substantial progress for about twenty years, but from then declined so rapidly that by 1885 a census showed 80 per cent. of the dyes used to be of foreign manufacture. So matters continued until the war, when the country woke up to the fact that its control of the dyes essential to its great textile industries had passed into enemy hands. One can still recall the enthusiastic resolutions—nowhere more enthusiastic than in the traditional free-trading districts of the north—that, whatever the price, never again should this country be left dependent on foreign supplies. The pledges, unfortunately, have evaporated in many quarters, but fortunately the industry has not. In just ten years the position has been exactly reversed—then we imported 80 per cent. of our requirements; now we manufacture about 80 per cent. Surely a great achievement, for which the British Dyestuffs Corporation and all the other independent companies are entitled to grateful recognition.

While the restoration of the industry is of more immediate concern than its fall, it is well not to forget the causes of the latter. The principal one, it is commonly agreed, was the lack of research. There was no school of organic chemistry in this country then, and before anything resembling one could be established the opportunity had gone. We have heard much of late of restricted expenditure on research, but to the British Dyestuffs Corporation the country owes the establishment of a splendid school of dyestuff chemistry. Over twenty years ago Dewar was complaining that while 69 per cent. of the chemists of Germany had university degrees, only 21 per cent. of the chemists of this country were of that rank. It is something to know that of the 125 chemists employed by the B.D.C. 83 per cent. hold high university degrees, and that they are working not in isolation but as one essential part in a great co-ordinated organisation. Already the members of the B.D.C. chemical staff are enriching the literature of dyestuffs chemistry by text-books of universal value, and it is a real satisfaction to the proprietors of THE CHEMICAL AGE to have been able to undertake their publication. The latest contribution of this character, just out of the Benn press, is Mr. Cecil Hollins's great work on *The Synthesis of Nitrogen Ring Compounds*—a monument of industry and technical scholarship. Apart from the commercial aspects, some national pride may be felt in the fact that the industry is producing not only dyestuffs but great dyestuff chemists of the first rank, and indeed raising research to the place it should rightly occupy in industry generally.

It is common to think of the British Dyestuffs Corporation as a thing of recent growth, effected by the amalgamation of two existing concerns. An interesting diagram reproduced this week shows its direct descent from the earliest British companies. In three main lines it goes back to Read Holliday (1830), to Perkin and Sons (1857), and to Levinstein (1865). Constituting roughly one-half of the entire British industry, it is appropriate that it should represent by direct descent so many of the pioneer firms and workers.

A Noteworthy Publication

CHEMISTS, whether academic or technical, must have long since given up the attempt to keep abreast with chemical phraseology as it is met with to-day. The individual who aspires to omniscience so far as chemical terms are concerned is straining at the impossible, and to attempt to make a mere catalogue of the mind must be regarded not only as a misapplication of one's intellectual faculties but as a sheer waste of time. The reader of scientific literature is nowadays, however, faced with a real difficulty which has resulted not only from the vastly increased output of specialised literature but from the fact that the terms employed have multiplied, and are continuing to multiply, at a rate which is little short of bewildering. The march of scientific progress must naturally be accompanied by the evolution of new words and expressions used for the purpose of denoting some particular state or condition which was not previously known. The research

worker who discovers a new state and coins a new word for it probably knows exactly what the newly introduced term is intended to imply, but his work may be buried in some inaccessible proceedings so that when the term passes into rather more common use the majority of readers are left guessing as to its true meaning. In many instances, again, some of the terms employed are not only vague but extremely loose, and it is difficult, if not impossible, to ascribe any exact meaning to them.

Under such conditions the path of the chemical reader is not easy, particularly as no attempt has, until now, been made to collate systematically all the terms (as distinct from substances) with which one is likely to meet. The publishers of THE CHEMICAL AGE have made an attempt to remedy the deficiency, and it is hoped that *The Chemical Age Dictionary of Chemical Terms*, which has been published this week, will justify the faith which we feel can be placed in it as a desk companion for everyone who has even the remotest connection with chemical science and practice. No dictionary on similar lines has yet appeared in the English language; and the view has been expressed by well-known chemists who have had an opportunity of seeing the early proofs that no similar publication has previously been attempted in any language. One would not wish to suggest that in this, the first, edition there may not be opportunities for improvement and elaboration, and it is in this direction that our readers can assist us by submitting suggestions which, in their opinion, would make the dictionary even more valuable than we believe it to be as it stands.

Sulphate of Copper Association

AN item of particular interest to those engaged in the production and sale of sulphate of copper lies in the news that a new association has been registered as a private concern, limited by guarantee, which will be known as the British Sulphate of Copper Association. The policy of the association, we understand, will be the co-ordination of British manufacture, thereby reducing overhead charges so as more easily to compete with foreign manufacturers, who by using their depreciated currency are enabled to sell abroad at cut prices. The brands affected by this arrangement are at present "Maple," "Three Leaf," "Macclesfield," sometimes called "Crown," and "McKechnie." The control is vested in a management committee the first members of which are the Mond Nickel Co., Ltd., McKechnie Bros., and J. H. Dennis and Sons. While the registered offices are 39, Victoria Street, Westminster, S.W.1, the headquarters of the association will eventually be established at Victoria House, Victoria Street, S.W.1. Mr. W. J. Livesey, sales manager of the Mond Nickel Co., Ltd., is acting as general manager to the association.

The Centenary of Cement

THE bronze tablet of Joseph Aspdin, presented to the City of Leeds by the American Portland Cement Association and formally unveiled on Saturday, is a reminder of a century's progress in the manufacture and uses of cement. It was in 1824 that Aspdin, a Leeds stonemason, discovered that by mixing finely pulverised lime with clay in certain proportions, burning it at high temperatures, and grinding the product, he could produce a new material for construction. He took out a patent and named his product "Portland cement," in the belief that it might prove a substitute for Portland stone for constructional purposes. That basic discovery has led to developments far beyond anything that Aspdin could have foreseen. Those developments are largely attributable to the influence of chemical and physical research and to mechanical improvements in the processes of grinding, mixing, drying, etc. And as the science and technique of cement manufacture have moved towards perfection so have its uses multiplied indefinitely. Two of the greatest uses of the future will be in large scale construction, of which Wembley supplies some striking illustrations, and in roadmaking, in which the United States has set the fashion. Although definitely related to chemistry, the cement and concrete industry has hardly been reckoned within the scope of chemical industry proper, but some of the larger chemical firms have now become directly interested in its manufacture and seem likely to take an increasingly large part in the future of the industry.

Points from Our News Pages

A summary is given of an interesting historical sketch of the British dyestuffs industry, published by the B.D.C. (p. 256).

An official review of American trade and commerce contains some interesting notes on the chemical and allied industries (p. 258).

The concluding portion is published of A. V. Slater's paper on "Recent Advances in Colloid Chemistry" (p. 260).

Dr. P. E. Spielmann contributes a letter on "The Titles of Chemical Papers" (p. 261).

A number of recent chemical text-books are reviewed by various writers (p. 263).

Economic conditions in France, with special reference to chemical industries, are reviewed in a Government report (p. 264).

The report of a Joint Committee on the Standardisation of Scientific Glassware refers to a guarantee of quality by manufacturers and to the specification of definite limits of error (p. 266).

Business in the London chemical market has been quite satisfactory during the past week, and the demand is said to be broadening (p. 272).

Continental offers are becoming more numerous in the Scottish market and prices for some products are easier (p. 275).

Books Received

THE BOOK OF RECEIPTS. By E. W. Lucas and H. B. Stevens. London: J. and A. Churchill. Pp. 474. 10s. 6d.

THE SYNTHESIS OF NITROGEN RING COMPOUNDS. By Cecil Hollins. London: Ernest Benn, Ltd. Pp. 424. 55s.

"THE CHEMICAL AGE" CHEMICAL DICTIONARY—CHEMICAL TERMS. London: Ernest Benn, Ltd. Pp. 158. 16s.

The Calendar

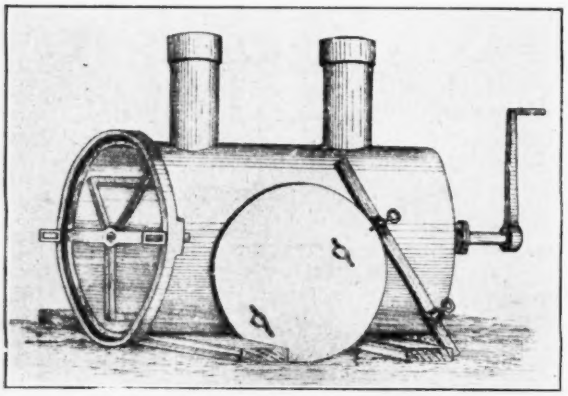
Sep. 15	Conference of Engineering Societies: "Co-operation between the Works Chemist and the Engineer," by A. R. Page and other papers.	British Empire Exhibition, Wembley, 10.30 a.m.
Sep. 13 to Oct. 25	Royal Photographic Society of Great Britain: 69th Annual Exhibition.	35, Russell Square, London, W.C.1.
Sep. 18 & 19	Ceramic Society: Refractory Materials Section Meeting.	Conference Hall, No. 4, Wembley.

The Story of the British Dyestuffs Industry

How it was Lost and has been Recovered

Among a group of publications just received from the British Dyestuffs Corporation is an attractive booklet which gives in outline the history of the synthetic dyestuffs industry in this country and incidentally of the Corporation itself, which, as the diagram shows, has an interesting British descent, going back in one line to Read Holliday (1830) *and in another to Perkin and Sons* (1857). *In the following article the substance of the pamphlet is reproduced.*

DURING the Easter Vacation of the year 1856, in a rough laboratory constructed and equipped at home, a youthful chemist was endeavouring by treatment with potassium bichromate to produce quinine from allyltoluidine. In this immediate aim he was entirely unsuccessful; a red powder being produced. A strong desire, however, to understand this peculiar and unexpected result led the investigator to repeat



PERKIN'S ORIGINAL ANILINE PLANT.

his experiment with a simpler material; aniline was then chosen, and this under similar treatment gave a perfectly black substance. The curiosity of the chemist was still not satisfied; the product was purified and dried, and when digested with spirits of wine gave a brilliant mauve coloured solution, which had strong dyeing properties. The first artificial dye had been produced. The chemist was but 18 years old, and his name William Henry Perkin. Thus was born an idea which laid the foundation of the synthetic dyestuffs industry which was to grow to such great dimensions.

The Beginnings of the ndustry

But Perkin was not content merely to make discoveries; he desired to manufacture and develop his new dye. With this object in view he submitted a sample to the well-known firm of Pullar, of Perth, and received a favourable opinion, provided it should not prove too expensive in use. Thus encouraged he took out a patent for his process, and so English patent No. 1984, of August 26th, 1856, was the first in all countries of a long series dealing with the production of dyestuffs, a list which to-day still grows. Perkin then proceeded, aided by his father and brother, to erect at Greenford Green, near London, works for the manufacture of Mauve, and towards the end of 1857 these were in operation. For his manufacture of Mauve Perkin required benzol, discovered by Faraday; his old professor, Hofmann, had shown in 1845 that this existed in coal tar, and his fellow student, Mansfield, had shown that from this source it could be obtained in almost unlimited quantities. Coal tar at this period was a waste article except for the pitch it contained. The raw material for manufacture, and the customer for his product awaited him—almost at his door. But Perkin needed nitro benzol and aniline, and neither of these substances had so far been made outside a laboratory, so methods had to be devised for their manufacture which should be safe and economically possible. It says much for Perkin's soundness of judgment that his processes are, apart from small modifications, those employed to-day; and much more for his technical ability that, substantially, modern plant in design is similar to that employed by him, except in being power driven, and of much greater dimensions.

The infant industry was growing, and as Perkin and Sons were requiring greater quantities of aniline than they could themselves manufacture, Messrs. Simpson, Maule and Nicholson, who had taken up the manufacture, began to supply aniline to the Greenford Green Works. The industrial success of aniline and Mauve caused the former to become a favourite compound to experiment with, and a direct result of this activity was the discovery in 1859 of Magenta by M. Verguin. Then came the discovery of Violet Imperial and Bleu de Lyon by two Frenchmen, although it was to young Nicholson that the credit belongs of first producing them in a satisfactory state of purity; and their value was still further extended again by Nicholson, who converted them by sulphonation into water soluble products. Thus arose Nicholson's Blue and Alkali Blue, the first of the Soluble Blues.

The industry in England was now well established and thriving. New and fertile fields for subsequent endeavour were constantly being opened up. The beginning of the great range of Azo dyestuffs may be traced in Nicholson's application of amidoazobenzene, discovered earlier by Méne, and for which a manufacturing process was patented later, in 1863, by Dale and Caro. Phosphine, the first of the basic oranges, was produced in the same year by Simpson, Maule and Nicholson. The year 1866 saw the first manufacture of Bismarck Brown at Manchester: Manchester Brown. Three years later saw Perkin manufacturing Alizarine, and the Greenford Green Works were at this time producing Mauve, Dahlia, Aniline Pink (Safranine), Magenta, Amino Azo Naphthalene, Britannia Violet, Perkin's Green, Alizarine.

In the meantime, responding to the atmosphere of prosperity, other firms had taken up the manufacture of coal tar colours. Roberts Dale and Co., of Manchester, were making Picric Acid, Induline, Manchester Yellow, Manchester Brown. Read Holliday, of Huddersfield, was making Magenta, Spirit Blue, Nigrosines, Basic Greens, Dimethylaniline, Aniline, and Toludine. Levinstein, of Manchester, was producing Magenta, Violet, Brilliant Green, Manchester Yellow, Chrysoidines. It was the golden age of the British dyestuffs industry, and there were names associated with the industry which have since become historic: Perkin, Hofmann, Griess, Caro, Martius, Nicholson, Mansfield, Medlock, Greville Williams, Schunck, and Meldola. The dyestuffs industry, in birth and development, was exclusively British.

Decline and Fall

Towards the end of 1873 Continental competition, chiefly in Alizarine, began to be felt. It was realised that a complete revision of the plant at Greenford Green had become necessary. It required extending and modifying, and a considerable expenditure of capital would have been required to carry out this work. It was at this stage that Perkin retired altogether from the industry; his ambition was towards pure science, and he felt that it was a convenient time to withdraw.

In 1874 the Greenford Green Works were purchased by Brooke, Simpson and Spiller, who had some six years previously taken over the business of Simpson, Maule and Nicholson. It was about this time, when the German production of Alizarine was making such great headway, that the decline of the dyestuffs industry in England set in, though of course it was not apparent for some years later. But by 1885 the industry in this country had lost to Continental manufacturers, chiefly German, the greater part of the trade of the United Kingdom. From a voluntary census of the source of dyestuffs used by the principal dye consumers in this country, it was ascertained that at this date practically 80 per cent. of the dyes used were of foreign manufacture. And this, as Green has shown, was true also of the early part of the twentieth century. There still, however, existed in this country several firms, of whom the most important were Levenstein,

Ltd., Read Holliday, Claus and Rée, British Alizarine, and Clayton Aniline Co., that kept alive with varying degrees of vigour what remained of the British dyestuffs industry.

Levinstein, Ltd., were manufacturing alpha-Naphthylamine and Naphthionate of Soda, which they commenced in 1891, and until about 1908 were supplying part of the needs of German colour firms. Read Holliday were producing Dimethylaniline, Magenta, Malachite Green, Auramine, and were members of the International Aniline Ring. What other colours were made were chiefly produced from intermediates purchased from abroad. Some research was carried out by these firms, as a perusal of the patent applications at this time indicates, but it was spasmodic and insufficient to have any important bearing on the progress of the British industry. Neither Read Holliday and Co. nor Levinstein, Ltd., had a complete range of colours of their own manufacture; both, however, were strong in sulphur colours—the former specialised to some extent in basic colours, Auramine, Methylene Blue, Violets and Greens; the latter devoted more attention to the Azo series.

The War Period

The period from the outbreak of war in August, 1914, until its close in 1918 was one of sustained and eager activity in the firms of Levinstein, Ltd., Read Holliday and Co., Claus and Co., etc. People could scarcely believe that a European war would in fact happen, consequently British stocks of manufactured dyestuffs and imported intermediates were, in comparison with the country's needs, almost trivial. The immediate effect of the war was the speeding up of manufacture of the limited range of dyestuffs produced by the English firms. Research on an ever and almost daily increasing scale commenced. Processes for the intermediates had to be worked out and plant improvised; buildings to be erected; plant to be constructed; works chemists to be trained; an organisation to be built up, and all this during a time of stress and anxiety when the country's urgent war demands on men and material were paramount. The poverty of the land was only too apparent. Neither H. nor J. nor Gamma acid was available; neither Paranitraniline nor beta Naphthol nor Benzidine was manufactured in this country. Of Dianisidine, of Peri, and Cleves acid, there were no stocks and no manufacturer. It was an industry with its lines of communication cut.

Fortunately, there existed, in the technical staffs of the firms that had in pre-war days resisted the foreign competition, the spirit of organic chemical manufacture, a leaven which was speedily to permeate the whole; and it may be fairly reckoned that it was this factor which enabled the individual firms to expand so rapidly and so successfully that, during a great crisis, the British textile industry's needs were met, not completely it is true, but fundamentally, for initially at all events it was a period of khakis and navy blues. Almost each month saw another dyestuff added to the swelling range. Claus and Co. had early concentrated upon the manufacture of Vat dyes—a group hitherto entirely neglected in this country; soon the first British produced Vat dyestuffs were placed on the market.

Levinstein, Ltd., took over, in June, 1917, the Indigo Works of Meister Lucius and Brüning at Ellesmere Port, then standing idle, and in November of the same year manufacture was so far advanced that regular supplies were available. This was a splendid achievement in speed, in organisation, and in technique. The synthesis of indigo on the large scale direct from benzol had now been accomplished in England for the first time. And in the same year Levinstein, Ltd., purchased the firm of Claus and Co. and a year later saw, under pressure from the British Government, an amalgamation of the principal dyestuff manufacturing firms of British Dyes, Ltd., and Levinstein, Ltd., under the style of British Dyestuffs Corporation, Ltd., with the late Lord Moulton of Bank as chairman of directors.

It has been clearly shown that the British dyestuffs industry is not an upstart industry; nor is the British Dyestuffs Corporation an upstart company. It is of the direct line. The present firm can, through Claus and Co., trace its descent from Brooke, Simpson and Spiller, and Perkin and Sons. The British Dyestuffs Corporation can take pride in its ancestry; and its final and complete success will add a delightful touch to an already romantic story.

Recovery

During the war, and to some extent afterwards, although there were outstanding exceptions, the quality of the dyestuffs made in Great Britain was not fully up to the high pre-war German standard. This feature, inseparable from the early stages of pioneer manufacturing work and a phase, passed through by the German manufacturers at a corresponding period of their development, was soon surmounted. To-day, British-made dyestuffs have nothing to fear from comparison with foreign products. Research, which it is agreed is vital, is now carried out on a scale entirely unprecedented in this country. The British Dyestuffs Corporation alone during five years has laid out on research a sum of £450,000, and is still expending well over £50,000 per annum.

But research is not all; the laboratory experiment is often very different from large scale manufacture, and here comes in technical ability. There is within the British Dyestuffs Corporation a complete small scale plant in which the technical aspect of works operations can be studied.

The dyestuffs industry is an industry for the trained chemist. Sir James Dewar, in his presidential address to the British Association in 1902, drew an ill-favoured comparison between the chemical staff in the German chemical industry and those in the English industry. In the former 69 per cent. of the chemists held high university degrees, in the latter only 21 per cent. were university graduates. The British Dyestuffs Corporation believes in the trained chemist. In addition to research, all the stages in the manufacture of dyestuffs and intermediates are under the direct control and immediate supervision of highly-trained chemists. Consequently to-day the British Dyestuffs Corporation employs 125 chemists, of whom 83 per cent. hold high university degrees. In addition to its chemists, the Corporation now employs over 30 trained colourists and about the same number of engineers. The works are modern in every way, and well laid out for the work in hand. Indeed, except perhaps in magnificence, they compare with the wonderful German works.

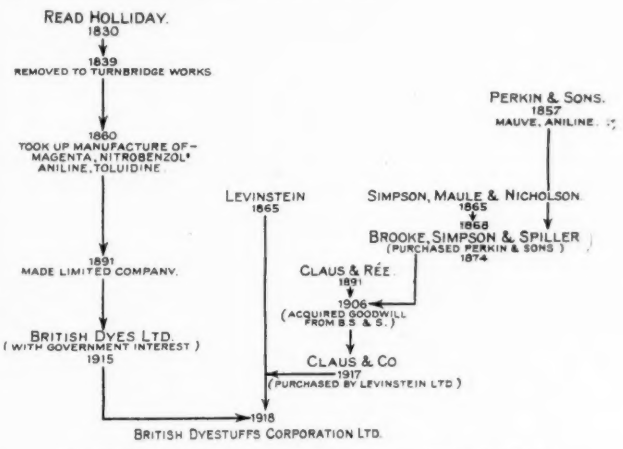


DIAGRAM SHOWING THE DESCENT OF THE BRITISH DYESTUFFS CORPORATION.

Finally a word about the future. It is freely admitted by those competent to judge that 80 per cent. of the dyes used in this country are now British-made, which is an entire reversal of the position from 1885 onwards. The British dyestuffs industry can therefore claim with all modesty that it has made good. This is not to say it has reached its ultimate goal. Such criticism as now exists is mainly directed towards price questions, but the trend of the general average of prices has consistently been downwards. What is important is not so much where we stand as which way we are going; and the direction is right. The last few years have been years of acute and world-wide trade depression, and the advantages to be secured by regular and bulk production cannot of course be obtained until trade becomes normal. Rome was not built in a day, nor will be the British dyestuffs industry, but what has already been done is in every way an earnest of abundant and final success.

Chemical Trades of the United States

Review of Conditions in 1923

The following notes on the chemical and allied trades of the United States during 1923 are taken from Mr. J. Joyce Broderick's report, dated April, 1924, on the "Finance, Industry and Commerce of the United States," just issued by the Department of Overseas Trade (H.M. Stationery Office, pp. 136, 3s. 6d.).

Most branches of the chemical and allied trades enjoyed very fair prosperity in 1923, satisfactory conditions being especially noted in the industrial alcohol and other industrial chemical industries. Unusual activity in the building trades was a particularly favourable feature of the year for producers of paints and varnishes whose sales and profits broke all previous records. Manufacturers of fertiliser and fertiliser materials emerged from a long depression and benefited largely by the improved conditions in the agricultural districts, especially in the Southern States.

Coal Tar Products

Producers of coal tar products, on the other hand, while aided to some extent by the cessation of shipments of reparation dyes from Germany, as well as by substantial increase in exports, were hampered by unstable prices on the home market.

A preliminary statement just issued by the United States Tariff Commission indicates that American plants turned out coal tar dyes in 1923 to an aggregate extent of 92 million lb., valued at $50 million. This production exceeds that of 1902 by 42 per cent. and stands in striking contrast to the 7 million lb. placed on the market in 1914 by the assembling plants that represented the country's dyestuff producing industry in that year. The chief individual products in 1922 and 1923 were as follows :—

	1922. Lb.	1923. Lb.
Indigo	15,850,752	28,000,000
Sulphur black	12,877,649	16,000,000
Direct black, E.W.	5,400,000	7,000,000
Azalma black, 10 B.	1,670,000	2,500,000

It is further recorded by the Commission that many new colours of high fastness, for use in the dyeing of silk, wool, and cotton, were obtained at American producing plants last year, but the domestic industry is still deficient to some extent in the production of a limited number of vat and other colours that are now imported.

The average sales price of American finished dyes during 1923 was 54 cents per lb. as compared with 60 cents in 1922.

Intermediates were turned out to a total extent of 230 million lb. as against 165 millions in 1922, the leading descriptions and quantities being :—

		Lb.
Aniline oil	Over	26,000,000
H. acid	About	3,500,000
Phthalic acid and anhydride	Over	2,000,000
Anthraquinone	,,	800,000

The total exports of coal tar products in 1923 were valued at somewhat less than $12½ million as compared with about $7½ million in the previous year, the principal item being finished colours and dyes, of which about 18 million lb., valued at $5¾ million, were shipped to foreign countries in the twelve months ended last December. This represented an increase of 100 per cent. in total quantity and over 37 per cent. in total value over the exports of those colours in 1922, which must be regarded as a satisfactory improvement, though the value of the 1923 exports is 81 per cent. less than that of the exports in 1920 when German competition was not being severely felt. The trade has, however, taken note of the fact that British exports of similar products showed a much greater gain in the same period, and developments in the British coal tar products industry are consequently being observed here with unusual interest.

Anglo-German Agreement

Very special attention is being paid to the reports of recent Anglo-German dyestuffs negotiations. There is apparently no fear that any Anglo-German agreement can enable British or German colours to come into the United States in unduly large quantities over the tariff wall, but a certain apprehension is felt in some quarters lest an arrangement for the division of particular foreign markets between the British Dyestuff Corporation and the German Interessen Gemeinschaft, with attendant interchange of secret manufacturing processes, may lead to so great an increase of British manufacturing and German marketing efficiency as seriously to curtail the demand for American dyes in the Orient and in South America. In a recent leading article the *Oil, Paint and Drug Reporter* of New York pointed out that although a few months ago American makers were supplying two-thirds of the artificial indigo imported into China, a single German shipment of this same product sent forward in a recent month to China was almost equal in quantity to the earlier American portion of a whole month's receipts in that country. This transaction, coupled with the fact that the German selling prices were no lower than the American, is taken as a good illustration of the formidable character of existing German competition in overseas markets.

The domestic demand for American dyestuffs is poor at the present moment owing to continued slackness in the domestic textile industry and energetic efforts are being made and planned by American dyestuff producers to secure adequate foreign outlets for the products which domestic consumers fail to absorb.

Imports

Imports of finished coal tar colours, dyes, stains, etc., into the United States in 1923 were valued at $4,864,000—about $750,000 less than the previous year. There was a decline of a like amount in imports of alizarine and its derivatives. Intermediates to the value of $608,000 were imported as compared with $422,000 in 1922. The most notable increases in imports under the coal tar chemical schedule were those of creosote oil and naphthalene which compared as follows :—

	1922. Lb. (Thousands.)	1922. Dollars. (Thousands.)	1923. Lb. (Thousands.)	1923. Dollars. (Thousands.)
Creosote oil	41,568	4,240	64,200	10,071
Naphthalene	3,144	54	21,036	579

Imports of dyes came last year from foreign countries in the following proportions :—Germany, 47 per cent. ; Switzerland, 28 per cent. ; Italy, 12 per cent. ; France, 6 per cent. ; Great Britain, 4 per cent. ; other countries, 3 per cent.

Nitrate Supply

Reference was made in the last report to the measures begun during the war to ensure an adequate supply of fixed nitrogen for the military, agricultural, and industrial needs of the United States. It will be recalled that an appropriation of $20 million had been set aside by Congress in 1916 to be used by the Federal authorities in the development of power for producing fixed nitrogen from the air, and that by April, 1921, about three-quarters of this sum had been spent upon the partial construction of a dam, power-house, locks, etc., at Muscle Shoals on the Tennessee River. The question of the disposal of this valuable property has engaged the attention of the War Department in the meantime and consideration is still being given by Congress to an offer for its outright purchase submitted by Mr. Henry Ford. The main concern of the authorities is to have the works at Muscle Shoals available for the fixation of nitrogen for military use in the event of war and also, perhaps, as a source of domestic supply in normal times, which would act as an effective check upon prices of imported nitrate. The importance of this last consideration will be plain when it is remembered that the United States now absorbs nearly double the amount of pre-war years. In 1920 about 300,000 tons of nitrate was used in this country for agricultural purposes alone and the imports in 1923 amounted to 892,000 tons.

American manufacturers of explosives, dyes, artificial leather, artificial silk and many other products have a very real interest in the matter, but it is the increasing dependence of American agriculture upon the liberal use of fertiliser in the soil that has induced the Government of the United States

to take a direct hand in investigating the existing nitrate resources of the world, the cost of its transportation, marketing and so forth. In March, 1923, a special appropriation was provided by Congress for governmental inquiry into the dependence of the United States upon a few classes of raw materials now derived chiefly from foreign countries. One of the principal materials to be studied was nitrate of soda, and the investigation is already far advanced. The Director of the Bureau of Mines, assisted by a Special Agent of the Department of Commerce, paid a visit to Chile last autumn to study the Chilean nitrate situation on the spot. The result of their inquiries is contained in a pamphlet published in January, 1924, as a special supplement to the weekly Government publication, *Commerce Reports*. The pamphlet deals at length with each of the factors influencing the cost of Chilean nitrate and concludes that the price of Chilean nitrate " will continue to fix the price of fixed nitrogen in general in the United States." It recommends American participation in the Nitrate Producers' Association. The contents of the pamphlet are extremely interesting and its perusal is recommended. It will be followed in due course by studies of the present American sources of fixed nitrogen supply, the economic role of nitrogen in American agriculture, the status of the air-nitrogen industry, and the nitrogen supply in various countries.

Magnesite

The Tariff Act of 1922 imposed duties on magnesite which appear to have revived, to some extent at least, the mining of that material in the State of Washington where production had dropped from 222,000 tons in 1920 to practically nothing in 1921 and 1922. In 1923 the Washington magnesite mines reported an output of about 35,000 tons (dead burned and plastic) while California mines produced some 30,000 tons of plastic magnesite. An application now before the United States Tariff Commission for a reduction of duties on magnesite is naturally being strongly opposed by the domestic producers. Total imports in 1923 amounted to 76,817 tons.

Graphite (Plumbago)

The American graphite producing industry does not seem to have been greatly stimulated by the new import duties, which have not bridged the difference in cost between the foreign and domestic material. The best imported flake sold as low as 4 cents a pound in New York in 1923, and against this price it was impossible for domestic producers to compete. Consequently the domestic output, though slightly better than the preceding year, was much restricted. Imports during the year totalled 39,634,000 lb. The imports from Ceylon showed a small increase, but the Madagascar product is steadily gaining ground in the American market. The Ceylon producers should neglect no opportunity to demonstrate the superiority of their product, and it is gratifying to know that they are at present taking steps with this object in view.

Chromite

Mining of chromite in the United States may almost be said to have reached a standstill in spite of the heavy duties imposed in 1922. According to the Geological Survey the output from Western States in 1923 was only about 300 tons, as compared with 104,000 tons in 1918. Imports in 1923 came chiefly from India, which appears to have supplanted New Caledonia as the principal source of supply of chromite for American steel companies. A considerable quantity of chromite came forward in 1923 to the Bethlehem Steel Company from a mine operated by that company in Cuba.

Tungsten

Tungsten presents still another example of the failure of import duties to restore a domestic mining enterprise which can only be operated at much higher cost than its foreign competitors. The present duty on tungsten is $7·14 per unit. In spite of the protection afforded by this duty only two companies, with properties situated in Colorado, reported production in 1923. Their joint output amounted to only 241 short tons of concentrates, and it is stated that their cost of production was about $12 per unit. " The duty on tungsten," says an expert of the United States Geological Survey, " has accomplished little more than to enrich those holding cheap ores in stock."

Sulphur

In the sulphur industry two interesting events took place, namely, the formation of an export combine and the conclusion of an agreement between the latter and the Italian authorities under which Silician producers will co-operate in the sale of the American product. The export combine is known as the Sulphur Export Corporation, its organisers being the three principal American producers. Production of sulphur by American mines in 1923 amounted to 2,035,000 tons as against 1,831,000 in the previous year. Exports at 472,525 tons were slightly less than those of 1922, but their value was somewhat greater. Stocks at the end of the year had increased to 2,900,000 tons. Production and imports of pyrites in 1923 were 181,628 tons and 260,000 tons respectively, the latter coming almost entirely from Spain.

Potash

The production of potash in the United States has declined rapidly since 1918, and, with the exception of the Trona Corporation, the only companies now reporting production are those which recover the material as a by-product in other industrial operations. Their total output in 1922 was stated to be 11,714 tons. Their figures for 1923 are not yet available, but they are believed to have increased their production considerably. For the benefit of the farmers, potash was placed on the free list when the Tariff Act of 1922 was passed, but demand for an import duty is now again being heard, and general interest in the subject has been revived by a recent announcement from the United States Geological Survey that indications of a valuable deposit of potash have been discovered in a salt bed extending through Western Kansas, Oklahoma and Western Texas, lying nearer the surface than the minerals in either Germany or Alsace. A bill, which is still under discussion, has been introduced into Congress, appropriating $500,000 annually for five years to enable the Geological Survey to explore the location and extent of potash deposits in the United States. Imports of potash into the United States last year amounted to nearly 231,000 long tons.

Artificial Silk

The artificial silk industry continues to grow, with improvement in the industrial processes and the better adaptation of the fibre to varied industrial uses. The increase may be seen from the following statistics of production :—

	Thousands of lbs.
1913	1,566
1919	8,000
1920	8,000
1921	15,000
1922	24,406

The German Loan and American Trade

DEALING with the question of the effects of the proposed German Loan, *Drug and Chemical Markets* says that American manufacturers will find German competition severe in many lines, such as dyes and chemicals, but the improved conditions in Germany will bring a better demand for American goods that do not come in direct competition with German products. An indirect benefit will be felt in the United States when Germany buys raw materials in other countries, nitrates in Chile, crude drugs for manufacturing pharmaceuticals with which she is preparing to flood the United States, cinchona and quinine from Java, coffee from Brazil, and other products obtainable only in one or two countries where produced. The distribution of the German loan over the world in this way will supply funds for imports needed in those countries, and the United States will share, probably, in this revival of world trade.

Latex Rubber Production

THE Department of Overseas Trade learns that, according to a report of the Rubber Producers' Association, the total exports of latex from Netherlands, India, during the financial year 1923 amounted to 6,458,000 kilogrammes, almost entirely from Belawan. Of this quantity 6,440,000 kilogrammes were destined for America, and rumours state that contracts have already been closed for 1924 for the delivery of rubber in latex form. Unsuccessful efforts are stated to have been made at the Batavia Freights Conference to obtain a reduction of the freight rates for latex.

Recent Advances in Colloid Chemistry.—(II)

By A. V. Slater

The author, who recently read a comprehensive paper on this subject before the Hull Chemical and Engineering Society, has embodied the substance of his investigations in two articles, the second of which is published below.

THE recently published bibliography of H. N. Holmes contains some 1,800 references to colloids, so that it is obviously impossible to do more than skim the surface of the vast ocean of "Recent Advances in Colloid Chemistry." Accordingly I have chosen a few which, either by reason of their ingenuity or their industrial importance, will, it is hoped, afford most interest.

The gradual blackening of electric light bulbs was due to a condensation of metal ions from the filament on to the glass surface. The makers have recently begun to coat the inside with a thin film of certain salts which acts as a dispersing medium for the metal ions and prevents their coalescence to an opaque film of metal.

Two French chemists have recently succeeded in synthesising mother-of-pearl. Natural mother-of-pearl consists of calcium carbonate, which is formed by diffusion in the midst of a colloidal mass of conchyolin, an albumin which is secreted by the animal. The conchyolin assumes the form of a network which is subsequently filled with calcium carbonate. By precipitating calcium carbonate in gelatin the natural process has been imitated, and a surface is formed of a large number of fine threads of calcium carbonate which form a diffraction grating to which the colours are due.

Bhatnagar and Mathur succeeded last year in forming artificial agates, by making a silica gel and allowing ferric chloride to diffuse in through the gel which contained sulphuretted hydrogen, sodium lanthanum hydrogen phosphate or potassium ferrocyanide. This is a direct application of the phenomenon of Liesegang rings.

A recent application of the theory of electrical precipitation of colloids is due to W. D. Bancroft, who has carried out experiments in the States on the dispersing of mists and clouds. An aeroplane takes up a load of sand above the mist or cloud and sprays it with the sand which is given an electric charge as it passes through a nozzle. The electrically charged sand falls on the cloud and precipitates the oppositely charged drops of water, so dispersing the cloud.

Formation of Colloids

Except on a small scale substances have not yet been prepared in the colloid state to any extent. (It might be well here to point out that there is a difference between the true scientific meaning of the term "colloidal" and the technical use of the term. As is usual, the technical term is of much wider application and includes what most of us would call suspensions.)

During the last few years the Goldschmidt Akt.-Ges. have patented methods of preparing "colloidal" substances, which consist in vaporising the substances, and then condensing the vapour in the form of fumes, which are then recovered by electric precipitation. The products are suitable for use as catalysts and as adsorbents for clarifying liquids.

An important advance in the application of colloids to industry is the invention of the Plauson Colloid Mill, which claims to grind substances to a colloidal degree of fineness. Personally, I should say that it may be possible to reduce substances to a much finer degree of sub-division than has hitherto been obtained, but I should call the resulting products very fine suspensions or emulsions, hardly colloidal solutions. Although the Plauson Mill has only been on the market for such a short time, patents have been applied for its application in many industries. The Mill has been applied to the manufacture of perfumes, flavouring essences, homogenised milk, lubricants and viscose. The makers claim that great success has crowned their efforts in the paint industry, and also that many oils that are difficult to saponify are more easily saponified in the mill owing to the intimate contact brought about between the oil and soda.

Separation of Colloids

A recent, and what promises to be a most important, advance relating to the chemistry of colloids is the invention by Dr. H. S. Hele-Shaw of the Stream-Line Filter. The filter consists of a pack of perforated sheets of suitable paper arranged so that when stacked together the perforations form tunnels, alternately wide and narrow. The liquid to be filtered passes into the wider tunnels and on application of pressure percolates the interstices of the paper pack and passes into the narrow tunnels, leaving behind a deposit of separated solid matter on the walls of the wide tunnels. The outstanding feature of the machine is its extraordinary sensitiveness. It is possible, for instance, completely to separate dyes from solution; to decolorise peat water; to remove the cloud from oil due to emulsified water; even to remove some of the salt from sea water. Copper sulphate is filtered so that the filtrate comes out a light green, and as Dr. Stephen Miall suggests, it is possible that the filter may throw some light on the problems of solution. Paraffin used for washing machinery is rendered pale straw colour, although ordinarily filtered it is red.

Dr. Hele-Shaw writes me that there have been sold already 50 large and 100 small laboratory filters, and the following is a list of "substances and industries on or for which filtration has been successfully tried":—Baryta, bleaching, brewing, coke ovens, cider, dyes, edible oils, gasworks, fish refineries, ink, jam, laundry, water, leather, mining, mustard, mineral oils, paint, paper, petrol, public baths, sewage, silk, soap, starch, sugar, tungstic acid, varnish, water supply, wool washing.

Obviously the Stream-Line Filter bids fair to mark an epoch in filtration and the separation of colloids.

Adsorption

Adsorption plays an important part in many industrial processes and perhaps in none so important as in catalysis. An example of a recent development which depended upon, adsorption is seen in the manufacture of tetralin and decalin hydrogenation products of naphthalene, which are finding great use in industry as solvents, turpentine substitutes, and fuels, etc. The hydrogenation of the naphthalene would have been impossible had not cheap and efficient purification been effected by extraction of the deleterious thio-naphthene from the crude naphthalene by adsorption on Fuller's earth or decolourising carbon. Again, after purification the naphthalene is treated in an autoclave with 5–10 per cent. catalytic nickel which is adsorbed on Fuller's earth. The whole of this new process, yielding an important new product, depends upon adsorption.

Silica gel is now being used extensively as an absorbent The adsorptive properties of silica gel depend on the great internal surface offered by the ultra-microscopic pores of the substance. E. B. Miller, in describing experiments conducted on a semi-plant scale, stated that the recovery of vapours of volatile liquids was :—

	per cent.
Ether	84·7 and 90·4
Acetone	82 ,, 93·5
Benzene	86·5 ,, 95·5
Petroleum ether	84·7 ,, 94·5

The most important applications of silica gel are perhaps to adsorption and recovery of vapours, but that its uses are not limited to this sphere is proved by the many patents covering its use in other directions, such as refrigeration, drying of blast furnace gases, and refining of oils.

Paul Beyersdorfer has discussed the explosion of sugar dust, and demonstrated the electrification of the dust particles by rapid whirling in air. An aerosol was formed, and when the maximum capacity was reached a discharge, accompanied by flashing, occurred. The violence of the explosion was attributed to adsorption of air at the surface of the dust particles, oxygen being more adsorbed than nitrogen.

A new industry has been founded in the States by the application of the colloidal properties of bentonite. Bentonite is a naturally occurring clay which possesses remarkable properties on account of its colloidal condition. Its uses are still being explored, but one entirely original industry that has resulted from the discovery of bentonite is the de-inking of

paper. It was found that the bentonite could adsorb the carbon and that a sheet almost equal to the original in quality was obtained. The significance of the discovery may be judged from the statement that 325 tons of waste newspapers might economically be collected daily and converted into about 260 tons of clean paper in Chicago alone.

Flotation of ores is a process that has been largely developed during the last few years. It is only possible to sketch the process, which has developed into a highly technical one. Briefly, then, minerals that are wetted by water do not float, and those that are not wetted float. The success of the process depends upon the fact that it is possible to cause the valuable mineral to float on the surface of water while the unwanted dirt settles to the bottom. The finely ground ore is dumped into a tank or separator and air is bubbled vigorously through the liquid suspension. A small quantity of a suitable oil is added and as a rule a substance that will stabilise froth, such as saponin. A froth is formed that contains most of the valuable ore and can be scraped off. Such are the principles of ore flotation, by which it is said that 60 million tons of ore are handled in America every year—and yet the process is only a few years old. The lead and zinc and other ores that are now treated by this process were formerly regarded as worthless owing to their high gangue content.

Flocculation and Deflocculation

Perhaps the most important of the phenomena of substances in the colloid state are the opposite ones of flocculation and deflocculation. Dr. Acheson, in his English patent of 1907, describes a process for producing colloidal graphite. It is familiar to everyone and is sold under the trade names of Aquadag and Oildag. I am not mentioning this as a recent example of advance in colloid chemistry—as it dates back to 1907 I consider it quite ancient!—but what I want to point out is that some people thought that Acheson had made a wonderful discovery, a new method of preparing colloids. In reality, as he himself said, he was only applying the principle of the Egyptians who used straw infusion for making bricks. He deflocculated the graphite, nothing more, and so instituted a new industry and gave the world a new product.

The patents of Feldenheimer and Plowman must be extremely interesting to anyone in the clay industry. They have patented the use of small quantities of electrolytes for deflocculating clay, whereby the finer particles remain longer in suspension while the dirt and coarse particles settle out. After settling, various salts are added which flocculate the clay suspension and so effect concentration. As far back as 1883, H. Brewer reviewed the existing state of knowledge with regard to the settlement of powders from liquids, but it has not been until recently that application has been made in a systematic way of the addition of alkalis and acids to clays for refining purposes. Feldenheimer and Plowman have investigated the effects of different reagents on different clays and have suggested the use of rosin soap, meta- and pyro-phosphates and the addition of caustic alkalis containing lime. They use alum for flocculation. The Americans have realised the importance of clay refining more than we have, perhaps because of necessity.

Of all the vicissitudes to which any industry could be subjected none has suffered such reversals as the rubber industry. Before the war the price of rubber had been as high as 10s. per lb. Two years ago the rubber growers offered a prize for new uses of rubber; the price dropped until rubber could be had for next to nothing.

The preparation of rubber from the latex is a colloid process, but as it is fairly old I do not intend to treat of it. During recent years, however, a new application has come into existence—I refer to the use of rubber latex in the paper industry. The admixture of rubber latex to the paper pulp confers certain characteristics upon the finished paper, such as surface feel, tenacity, etc. The problem has been to protect the latex from decomposition during its transit from the tropics. It consists of an emulsion of rubber in water along with other things, such as resins, proteins, etc. The protection of the latex has been accomplished by the addition of various reagents such as ammonia, which prevent coagulation of the rubber particles and so keep the rubber in a dispersed condition.

In order to reduce the freightage costs attempts are being made to redisperse the raw crêpe rubber, as ordinarily shipped from the plantations, to form an artificial latex. Pelizzola, of the Pirelli firm, has found that if a solution of rubber in benzene is agitated with a 2 per cent. solution of ordinary soap in water, an emulsion is formed which contains the rubber as dispersed phase, as globules of approximately the same size as those in the natural latex. From this emulsion the rubber may be coagulated by any of the ordinary methods.

Endosmosis

One of the phenomena of colloids is the migration in an electric field. The migration of the particles is called cataphoresis and the movement of the liquid through a colloid membrane is called endosmosis. Count Scherwin in a series of patents has attempted to apply these principles to industry, with a fair measure of success as regards results, but a less measure from the economic standpoint. Briefly, the process for the purification of clay consists in passing an electric current through the clay suspension. The clay, which is negatively charged, travels to the anode, and the impurities (iron, which is positively charged, and silica, which is neutral) travel to the cathode or remain in suspension.

A more successful application is to the gelatin industry. Gelatin is prepared in a specially pure form for photographic purposes by passing an electric current through a solution of crude gelatin. The crude gelatin is enclosed in a porous vessel and a current passed through the solution, through the porous vessel, and collected by a cathode in an outermost containing vessel. The electrolytes pass through the porous vessel and the fats are coagulated and removed by mechanical means, leaving behind a solution of pure gelatin.

I have not exhausted my subject—in fact I have not even presented a tithe of the multitude of "Recent Advances in Colloid Chemistry," but I should like to conclude by quoting a somewhat striking passage from the *J. of Ind. & Eng. Chem.* (1923):—

"The theoretical and industrial importance of colloid chemistry is now admitted without question. In fact it links together the sciences of chemistry, physics, zoology, botany, geology, medicine, agriculture and even astronomy, whenever that science deals with comets' tails. Few are the industries that do not have colloid problems to solve. The average citizen is surprised to learn that his own body is colloidal in composition, that his digestive processes are governed by colloidal rules of action, and that the bacteria of disease are of a colloidal degree of dispersion. And he is astonished to learn that but for the colloidal adsorption of calcium phosphate from the blood stream by his bony cartilage he would be a mere spineless jellyfish."

"The Titles of Chemical Papers"

To the Editor of THE CHEMICAL AGE.

SIR,—The author of this article raises a valuable plea for increased significance in the titles of chemical papers, but he reckons without the indexer. Even a long title to a paper will not always give an adequate indication of the facts to be found in it, and no title will ever be as great an assistance as is a good subject index. Here a record of, or an easy indication to, every fact can and should be given; many indexes fall very far short of this ideal; some, on the other hand, approach closely to it.

A title can, at best, be but a "first approximation" to the information that is being sought. For instance: if a paper be correctly and adequately entitled, "On the Refractive Index of Benzone at Various Temperatures," only search—or good indexing— will reveal incidental but valuable information on the purification and boiling point of the compound. And with the best will in the world it may be impossible to entitle a paper anything else than "Some Properties of Ozone"—of which "T. W. J." disapproves—as the only alternative would be their enumeration in the title. In such a case it is the indexer's business to assist the reader to a more precise anticipation of what may be worth studying.

A more meticulous mind than that of "T. W. J." might complain that the title of this very article should be placed in his own "indefinite" category, as an accurate indication of its contents could only be obtained from wording such as "The Inadequacy of the Titles of Many Chemical Papers"; and there might be some one who would complain even of this.

No, I think salvation lies with the indexer.—Yours, etc.,

September 8, 1924. PERCY EDWIN SPIELMANN.

Reviews

ATOMS AND RAYS. By Sir OLIVER LODGE, F.R.S. London: Ernest Benn, Ltd., 1924. Pp. 208. 21s.

This book is one of Sir Oliver Lodge's happiest efforts, and to say that is, of course, to use a superlative of praise. Sir Oliver has doubtless been asked again and again to "describe" a book of assigned magnitude and form on a given straight line of science. If so, we feel that he must either have refused or at least have been unable honestly to write Q.E.F. at the finish of his work. No, he does not write to order; he goes his own way and so we get a book with continued reiteration of *l'homme meme*, which, whether he is right or wrong, gives us something delightful in style and something worthy in the way of scientific literature.

"It is only natural," he says, "for someone with a teacher's instinct to try to interest all intelligent people, and not only the expert few, in the marvels that are being revealed." And so in this book Sir Oliver, with evident zest, sits down beside us, persuades us from the first that we can understand him, and then says what he has to say. His personal recollections go back a long way: he was a great figure in science even thirty years ago, a leader of scientific thought and a bold experimental pioneer, and there clings to him the influence of those days in his reluctance to let the older ideas be belittled or lightly abandoned. It enables him also to make clear where the essential changes have been made and must be made in our fundamental views. It is this which gives peculiar value and interest to his book; he lived a long spell under the *ancien regime* and is living with a liberal and receptive mind through the revolution. No man is better qualified to tell us just what the changed conditions are involving. As he talks round the new wonders and explains the changes they necessitate, you can see why he has been persuaded to the newer faith. He describes in the most graphic way the essential features of it—the recognition of unsuspected discontinuities in energy and motion. Again and again he harps on this note, but never wearisomely. We must admit quanta, we must admit multiplicity of electron orbits. They are astonishing—we do not know how quanta are generated, we do not know what underlies the orbital jumps. Yet they are not to be denied, and Sir Oliver shows how well all the calculations fit. He turns the things round, reckons and re-reckons, and shows so many aspects that we feel as if we were sharing his own course of thought and seeing as he sees. We even think we know more mathematics than we really do. It is all admirably done; so much reiteration might so easily be dull, but here there is always the element of the unexpected and the uncommonplace, and our interest cannot for a moment flag.

The present writer is well aware that he is only qualified as a critic of this book to a limited extent and there may be things in it which can be controverted by the more learned, but he is quite certain that it can be justly commended as a work that cannot fail to be of great profit and pleasure to a multitude of readers. It is only fair, however, to say that the author's expectation of its being assimilable by what is commonly understood by the term "general reader" seems somewhat too sanguine. It is not an easy book for those who have not already some capital of general scientific knowledge—but for all those who have, it will be invaluable in helping them to a better understanding of one of the grandest chapters in the records of intellectual achievement. S.

COMPLEX SALTS. By William Thomas (Manuals of Pure and Applied Chemistry, edited by R. M. Caven, D.Sc.). London: Blackie and Son. Pp. 122. 10s.

The subject of complex salts invariably presents serious difficulties to the student, and the appearance of Dr. Thomas's very readable account will be especially welcome to the Final and Honours B.Sc. candidate, who has hitherto been compelled to absorb what he can from the monographs of Alfred Werner or Weinland.

The treatment is naturally based upon Werner's co-ordination theory, but a few pages are devoted to the older views, and reference is made, perhaps rather too briefly, to the recent theories of Lowry and Sidgwick, which involve the modern conception of the atom. The book concludes with a most valuable chapter on the practical preparation of important complex salts (potassium ferro- and ferri-cyanides, sodium nitroprusside, sodium cobaltinitrite and several cobaltammines), and two examples of resolution into optically active components are described.

The chapters on optical activity occupy one-fourth of the text, which may perhaps be justified by the part played by this property in determining structure; but the space devoted to asymmetric organic molecules is too generous, and the description of Pasteur's work on p. 47 is repeated with additions ten pages later. On the whole, however, the book is well-balanced and reads surprisingly easily—a tribute to the author's powers of exposition.

One or two questions which will occur to the student might with advantage be answered in the next edition. Why, for example, does the bi-valent CO_3 in carbonato-tetrammine-cobaltic chloride occupy two positions in the co-ordinated complex, while SO_4 in sulphato-pentammine-cobaltic chloride takes up only one (p. 31)? What chelate molecules are known, and what other properties have they in common?

The book is well printed and bound, and typographical errors are few and insignificant. C. H.

THE STRUCTURE OF MATTER. By J. A. Cranston, D.Sc. London: Blackie and Son, Ltd. Pp. 196. 12s. 6d.

The expository literature of the new science on the borderland of physics and chemistry grows apace, and students have already a wide choice of text books, mostly—let us be thankful to say—authentic, well written, and justified by some distinct individuality. The substance is necessarily much the same, but the proportion and emphasis are varied to suit different tastes and capacities. It is easy to understand the temptation of the theme, for there have been few such stories to tell in the whole history of science. When it is finished in one book we feel something of the child's pleasure in having it told all over again in another, without the child's insistence that it shall be told in exactly the same way.

Dr. Cranston, who inscribes his book to his teacher, Professor Soddy, has done useful work in radio-activity, and is also well qualified for the task he has undertaken by the possession of a lucid and interesting style of writing. He states that the book has been written from the standpoint of the chemist, and there is evidence of this throughout, and especially in the prominence given to the octet theory of the atom as propounded by Lewis and elaborated by Langmuir. After a well-written introductory chapter, the subjects of the electron, radio-activity, atomic numbers, isotopes, crystal structure are taken seriatim, and in the concluding chapters the electrical constitution of the atom is expounded in a clear and interesting way.

An outline of the Bohr theory is given, followed by a short account of Sir J. J. Thomson's model, and then comes a full and clear account of the views of Lewis and Langmuir, with abundant examples of the use of the octet atom. Special praise may be given to the diagrams and illustrations, some of which have an element of novelty.

It may be confidently stated that Dr. Cranston has achieved success in his aim of expounding the new atomic science in a way that will be of special interest and value to chemists.

A. S.

FISHES THE SOURCE OF PETROLEUM. By JOHN MUIRHEAD MACFARLANE, D.Sc., LL.D. The Macmillan Company, New York, 1923. Pp. 451. 25s.

This is certainly the most important attempt at the solution of the problem that has appeared in recent years, and perhaps in the whole history of the subject. It is the result of observation, of collection and comparison of facts during fifty years; it is the logical outcome of the author's theory that life started in fresh water, together with his studies on "The Evolution and Distribution of Fishes." The greater portion of the book consists of a most detailed account and discussion of the nature, quantity and dimensions of the deposits of fish remains in various parts of the world and from the earliest geological traces, and correlates them with the presence or remains of kerogen and of petroleum and its immediate associates.

Against the vegetable origin of petroleum the author shows bias based solely on weight of evidence; he considers the presence of petroleum associated with coal and other matter of vegetable origin to be an infiltration from near-by

strata that contain fish remains. With regard to the future, he is frankly optimistic. He considers that enormous quantities of oil exist, but that deeper and deeper borings may have to be made to reach them, and that "exhaustion of supplies need NOT be feared during many generations of mankind."

The general impression of the book is that it is a model of exposition and discussion, and that within its limits it is overwhelming in the conviction that it brings. But one cannot help feeling that "Fishes *a* Source of Petroleum" might have been a better title. P. E. S.

THE THEORY AND APPLICATION OF COLLOIDAL BEHAVIOR. Edited by ROBERT H. BOGUE. New York: McGraw-Hill Book Co., Inc. Vol I: Theory. Pp. 444. Vol II: Application. Pp. 386. 40s.

These two handsome little volumes consist of 34 separate excellent monographs—each by a different authority—on various branches of colloid chemistry and subjects in which colloid chemistry plays a part. In character, scope, names of headings and personality of some of the contributors they are similar to the Reports on Colloid Chemistry issued by the Department of Scientific and Industrial Research. This method of writing books is becoming quite fashionable; it has the advantage that all views are represented, specialists may dilate on their favourite topics and that the continuous change of style and treatment facilitates reading; on the other hand, it is difficult to avoid overlapping. It is impossible to judge such a treatise by the usual standards. There can be little doubt that it will appeal to a wide circle of readers. By reason of its ambitious setting the various chapters can only be very brief; however, those devoted to colloidal fuel, silica gel, emulsions and theories of emulsification might have been increased with advantage. The volumes contain much useful information and should serve as a valuable guide to a subject which is still in its infancy. S. P. S.

QUANTITATIVE ORGANIC MICROANALYSIS. By Fritz Pregl, D.Sc., Ph.D. Translated by Dr. Ernest Fyleman, B.Sc., Ph.D., F.I.C. London: J. and A. Churchill. Pp. 190. 12s. 6d.

The presence of compounds in very small quantities is now generally recognised as of the greatest importance in many chemical reactions, both biological and industrial, so that methods of analysing any small amount of foreign substance which may be isolated have assumed considerable importance. The classic methods for determining the composition of organic bodies are hardly suitable when only ½ to 1 gramme is available, so that a translation of Pregl's work on microanalysis, describing in detail the methods perfected by Professor Pregl, is of no small value. The work contains extremely full directions for the preparation of apparatus, and the methods recommended for the determination of the percentage of carbon, hydrogen, nitrogen, sulphur and the halogens, etc., in small quantities of material, and also additional methods of micro-electro-analysis, and methods for determining metals, carboxyl, methyl, methoxyl and other groups. Notes are added on methods of calculation of results, and a list is appended of some researches which had been made with the aid of the methods described in the work. It is perhaps a little unfortunate for English readers that the list of suppliers of the various pieces of apparatus should refer only to the original German makers, and not to actually available makers preferably in this country. Nevertheless, the book will undoubtedly prove invaluable to many research workers and analysts.

APPLIED CHEMISTRY. By IRA D. GARARD, Ph.D. New York: The Macmillan Co. Pp. 496. 15s. net.

This book has been produced to meet the needs of students of chemistry in a women's college in the United States, and deals mainly with the domestic and everyday aspects of the subject. Though it would not be suitable as a text-book for students in this country owing to the unusual field it covers, it might well form a valuable adjunct to more standard works. It is soundly and clearly written and makes interesting reading. The chapters on the preparation of foods, soap and cleansing agents, paints, varnishes and inks, enzymes, etc., contain many suggestions likely to provoke thought, and may act as an eye-opener to many readers to the fundamental importance of chemical knowledge in all branches of our modern life. A useful feature at the end of each chapter is a list of standard works, which may be consulted by those wishing to pursue the subjects further, although, as might be expected, the references are largely to American authorities.

CHARTS OF THE CHEMICAL REACTIONS OF THE COMMON ELEMENTS. By Dr. John A. Thimm. New York: John Wiley and Sons Inc. London: Chapman and Hall. Pp. 81. 10s.

This book is intended for students acquiring the fundamental facts of chemistry, and contains just those charts of the reactions of the common elements which are so useful as summaries of the knowledge obtained in the ordinary text book. The value of charts of this kind, however, lies mainly in their construction by the student himself, so that the present work hardly fills any great need in this direction.

Research into the Corrosion Problem

Surface Scale Formed in Sea-water

AT the annual autumn meeting of the Institute of Metals in London on Tuesday, a paper was presented by Messrs. Guy D. Bengough, D.Sc., and R. May, A.R.S.M., on the seventh report to the Corrosion Research Committee of the Institute of Metals.

The report considers the problem of corrosion largely from the point of view of the "scale" of corrosion products which soon forms on the surfaces of such metals as copper, zinc and brass immersed in sea-water. An account is given of the more important reactions which lead to the production of these scales, and of the way in which they are affected by changes in the conditions surrounding the metal and in the composition of the metal itself. The studies of copper and zinc are preliminary to that of brass.

An important feature of the report is the study of the behaviour of high-speed streams of aerated sea-water in glass and brass tubes, and the correlation of the behaviour of such streams with local corrosion. It is suggested that a large proportion of tube failures in modern condensers is due to local impingement of aerated sea-water, and that the actual distribution of corroded tubes in condensers often supports this view. The rapid corrosion is due to the local removal of protective scale by the impinging stream. Certain types of preformed scale, however, may be very resistant to this type of action, and a useful field of work has been opened up in this direction. The occurrence of "dezincification" has been found to be due, not to bad mixing of copper and zinc in the manufacture of brass, but to the absence of arsenic from tubes; even a mere trace of arsenic has been found to prevent "dezincification" in condenser conditions. The presence of arsenic, however, is by no means always desirable, and in some conditions a "dezincing" tube may behave better than a "non-dezincing" tube.

Careful observations on the electrolytic method of protection of condenser tubes have tended to throw grave doubts on the utility of this process; usually the results are negative, but occasionally good results have been reported, and it seems probable that these must be due to chance secondary effects, particularly of the anode products. The great difficulty with which the process has to contend in condensers is the uniform distribution of the current along the tube; most of it is short-circuited to the water-boxes, tube plates, etc., which are protected in preference to the tubes.

On the theoretical side the view is adopted that the corrosion of brass may be due to metal-ion concentration cells or oxygen-distribution cells; these may either reinforce or oppose one another according to the conditions. With high-speed water streams the metal-ion concentration cell may become the more powerful and render the metal anodic and severely corroded. Deposits of sand, porous masses of corrosion products, etc., may cause oxygen-distribution cells to become active and set up local corrosion, but the most rapid cases of corrosion seem to belong mainly to the former type. Sometimes the two types of action reinforce each other, as when pits are started by oxygen-distribution effects, owing to the unequal porosity of the scale. The thin layer of scale which covers them is finally broken down by the action of an impinging aerated water stream and the attack is carried on by the action of a metal-ion concentration cell.

The report is a document covering 150 pages, and contains a large amount of information about various and little known phases of condenser tube corrosion.

A Review of French Economic Conditions

Position of Chemical and Allied Industries

In a recently published Department of Overseas Trade Report on Economic Conditions in France, revised to June, 1924 (H.M. Stationery Office, 6s. net), Mr. J. R. Cahill presents important facts and figures dealing with every phase of French industry and commerce

MR. Cahill, in surveying economic conditions in France to-day, observes that the great economic revival experienced in 1922 has continued, and not only has the entire population continued in employment, but production has been consistently retarded by lack of labour.

Most remarkable is the progress made in the reconstruction of the devastated industrial areas. The recovery has been so rapid that in many instances the output of these regions now exceeds the pre-war figures. Particularly in the metallurgical, engineering and chemical industries has this progress been marked. In the course of reconstruction every care has been taken to provide the latest plant and processes, and improved by product and patent fuel plants have been incorporated. The natural resources have been increased by the acquisition of Alsatian ores, potash and oil. The chemical industry witnessed a highly important amalgamation of their principal dyestuffs concern with one of the two dominating concerns in the heavy chemicals trade. During the period under review dyestuffs duties have been raised from 200 to 650 per cent., and a prohibition on the export of coal, coke and patent fuel was instituted. Also the monopoly of the manufacture and sale of matches was abolished, and a consumption duty on matches of foreign and French manufacture was instituted.

Alsace Potash Production

France no longer requires German potash, and Alsatian potash is becoming of increasing importance as an export. In 1923 Alsace exported 660,000 tons of various classes of potash salts as against 618,000 in 1922, and only 276,000 in 1921. Under French control the output has steadily increased, and in spite of the fact that owing to the depreciation of the mark Germany has been able severely to undercut Alsatian prices, the French potash is steadily increasing its markets and consolidating its position.

Dyestuffs and Chemical Industries

The development of dyestuffs and chemical industries since the war has enabled France to free herself to a very considerable degree of her dependence upon Germany for extensive ranges of dyes. These are now produced by French firms whose technical efficiency has been and is being improved owing to the acquisition of the experience of the German industry. Independence of foreign imports of important fertilisers and other chemicals is being prepared—the production of synthetic ammonia by the State, which has approved a Convention concluded in 1919 with the Badische Anilin und Soda Fabrik, and is about to construct plant for the manufacture of the product by the Haber process at the Toulouse National Powder Factory. State production is to be seconded and possibly surpassed by private efforts on a large scale by leading chemical and mining groups It may be noted that in 1923 exports of products derived from the distillation of coal tar rose from about 2,300 tons in 1921 and 1922 to over 26,000 tons, and those of prepared dyestuffs amounted to 6,000 tons as against 3,245 tons in 1922 and 4,946 tons in 1921.

The production of coal-tar dyes has made great progress and a considerable export trade is now possible. In the four years 1920–23 the annual output of French factories amounted respectively to 7,056, 5,869, 8,067, and 10,000 tons, and imports to 5,888, 1,148, 1,797, and 1,371 tons. As regards the separate categories of dyes, imports of azoics have decreased from nearly half the amount of the home output in 1920 to about 16 to 8 per cent. in 1922 and 1923, when 3,575 and 5,124 tons were produced and only 906 and 444 tons were imported. The indigo dyes made in France (2,649, 1,395 and 2,132 tons in 1921–23) seem ample for the home demand, so that imports have practically ceased (51, 12 and 4 tons in 1921–23); and production in the sulphur group in these three years was 823, 1,710 and 2,279 tons as against imports of 47, 78 and 58 tons. Similar independence appears to have been practically secured as regards other groups such as alizarines, oxanines, thiazines, etc.; in fact, over 600 dyes covered by nearly 1,000 registered patents are now made in France.

Great prosperity has prevailed in most branches of the heavy chemical industry and export trade in the principal classes has increased. The industry has benefited by a policy of concentration. The union, by absorption of the Compagnie Nationale and Les Etablissements Kuhlmann, brings under one direction the production and marketing of almost the complete range of chemical products. The following is the table of exports for the years 1921–23 :—

	Thousands of Quintals.			
	1913.*	1921.	1922.	1923.
Sulphate of ammonia	—	39·2	120·6	66·3
Sulphate of copper ..	—	33·8	77·7	117·9
Sulphate of magnesia and of potassium; kainit	—	229·8	203·8	218·9
Carbonate of lead ..	—	2·4	2·4	1·9
Potash and carbonate of potash	—	5·1	18·2	12·3
Chloride of potassium	—	2,766·2	6,180	6,602·2
Chloride of sodium ..	—	680·5	1,644·0	1,839·8
Oxide of zinc ..	—	21·5	29·3	32·9
Products obtained directly from the distillation of coal tar	—	23·6	23·2	264·4
Celluloid	—	3·9	2·5	4·2
Tartrates of potash ..	—	65·1	86·6	114·4
Other chemical products	..	5,773·0	7,116·2	7,187·2
Totals	11,126	9,644·1	15,505·3	16,462·4

* Details not specified.

The fine chemical industry also shows a tendency towards concentration and consolidation. The manufacture of several synthetic products formerly made by Germany has made much progress and export trade is increasing. It has been decided to construct new works at Aber-Wrach, near Brest, for the production of iodine and other chemicals derived from marine vegetation.

Interesting Exports and Imports

During the years 1920 to 1924 noteworthy changes are observed. In exports ores of all kinds rose from 295 to 437 millions, and potash from 63 to 71 millions. Glass increased from 101 to 146 millions, and chemical products from 394 to 570 millions. Scents and soaps rose from 224 to 337. In imports chemical products and raw materials, particularly nitrate of soda, show marked increases.

Great Britain and Belgium (with Luxembourg) still continue to be the most important buyers, and principal exports to Australia in the last three years have been drugs, chemicals and fertilisers. The other British Dominions are not scheduled separately.

Fertilisers Production

In France an annual average of only 70,000 tons of nitrogen in chemical fertilisers is consumed (in 1923 French agriculture consumed only 66,000 tons—12,000 tons obtained from sulphate of ammonia, 15,000 tons representing 75,000 tons of imported sulphate of ammonia, and 39,000 tons representing 260,000 tons of nitrate of soda). Its utilisation has, therefore, been inadequate. The French Government, with the object of remedying the lack of wheat supplies, decided in 1919 to subsidise a company to erect a synthetic ammonia plant at the arsenal at Toulouse capable of producing by the Haber process 36,000 tons of fixed nitrogen per annum.

M. Claude has expressed the opinion that a fertiliser both nitrogenous and potassic can be produced at less cost than the price now ruling. His researches, in which he utilises a combination of synthetic ammonia and sylvinite (the Alsatian potash), have already resulted in an ammoniaco-potassic chloride being produced. This product is both cheap and immediately soluble, and if experiments prove successful it will certainly find favour with agriculturists. As regards superphosphates, this inventor hopes to substitute a simple natural phosphate which will be reduced to an impalpable powder by the Cotterel electric process at a price far below that which is now paid for superphosphates, which are dear on account of the sulphuric acid utilised.

Merseyside and British Chemicals

Sir Max Muspratt's Views on the Industry

In an interesting article in the current number of *Mersey*, the magazine of the Mersey Dock Board Staffs' Guild, Sir Max Muspratt deals with the extensive chemical industry connected with the Merseyside. The association of British chemicals with Merseyside, he says, has always been peculiarly intimate. The industry, as now we know it, was established there. The great technical inventions and processes of the last century have been worked out and developed within its borders. The growth of the textile industry in Lancashire has provided an increasing home market for the products of the industry, and the shipping facilities of the port have established Merseyside as the premier chemical-exporting centre of the world. The basic raw materials of chemical manufacture are salt, which is readily available in south-west Lancashire and Cheshire; limestone, which is locally obtained; and sulphur, which is imported into the Mersey either as pyrites or as brimstone. With these combined advantages there has been developed the great heavy chemical industry, with its main centres at Widnes, Runcorn, and Northwich.

Before the war the principal products were acids—principally sulphuric and hydrochloric—soda ash, caustic soda, chlorine, bleaching powder, and sulphate of soda. In these branches of the industry Great Britain has always been supreme, and Merseyside retains its prominence to-day.

The development of the organic branch of the industry was, for various reasons, confined mainly to Germany. This proved a great initial advantage to Germany for the production of high explosives, but in an astonishingly short time technologists of the industry on Merseyside had tackled and solved the problem of the production of unprecedented quantities of organic chemicals for explosives manufacture.

Post-War Conditions

Since the war this side of the industry has been extended, and the production of intermediates and dyestuffs in this country to-day represents 80 per cent. of the actual dye consumption of the country, as compared with 20 per cent. before the war.

It is impossible, in dealing with the chemical industry on Merseyside to-day, to omit reference to the fertiliser trade: firstly, because of its importance to the nation; secondly, because Merseyside has always been the most important centre for fertiliser production in this country, and thirdly, because of the exceptional circumstances under which this branch of industry is labouring. There are few trades that have suffered more from post-war conditions than the fertiliser trade, and by reason of low exchanges and consequently low comparative cost of labour abroad the British superphosphate manufacturer has been forced to sell his product against foreign competition at a price which has realised less than the actual cost of raw materials, exclusive of manufacturing cost. This has already resulted in the closing of works on Merseyside and in other parts of the country, and it is obvious that unless financial conditions improve in Europe the closing of works will be rapidly extended. Fortunately, there appear signs of the approach of financial stabilisation in Europe.

Perhaps the most interesting feature of the association of Merseyside with the chemical industry is as the exporting centre to all parts of the world. Just as at home many thousands of tons of the chemical products of Merseyside are absorbed annually by the textile, soap, glass, paper-making, tanning and other industries, so, abroad also, these products are essential materials for similar manufactures. There is hardly a single country in the world that does not receive a proportion of the export chemical trade of Merseyside.

For many reasons—into which at the moment it is not necessary to enter—the continent of Europe does not play the same part in the English chemical trade as it did at one time. Tariff walls have been erected by all the principal countries, but the British manufacturer still has many interesting points of contact. Outside of Europe he still enjoys the advantage of the work which was done for him by the early workers in the chemical industry in the United Kingdom. Mexico, Central America, and South America still trade with him, and the very names by which the pioneers introduced themselves to buyers in these parts are still household words. The Colonies and Dominions, South Africa, Australia, Canada, and New Zealand are still buyers of British chemicals, while in India, China, Japan, the Dutch East Indies, and the Straits Settlements, not only has the position of the British manufacturer been maintained, but it shows progress to an extent which would astound the forerunners in the industry.

Relation of Oxygen to Iron

Research Scheme in Progress

The chief feature of interest at the autumn conference of the Iron and Steel Institute, which concluded at Wembley on Friday, was the account given in a joint contribution from the National Physical Laboratory of a research on the alloys of iron, particularly in relation to the influence of oxygen on the properties of the material.

This research, which was begun a year ago, under the auspices of the newly-formed Ferrous Alloys Research Committee, is a fundamental investigation which bears upon the everyday problems of the manufacturing industry. That it has not been undertaken by one of the great works laboratories is explained by the fact that the task involved is too heavy for any establishment except a State institution well staffed and properly equipped and assisted by university laboratories in certain sections of the work.

Dr. W. Rosenhain, in an introductory statement, pointed out that the work which was being done was necessary for a satisfactory knowledge of the alloy steels now in use, and would, no doubt, cover a whole group of other steel alloys, the properties of which were at present unknown. The great cost involved had, however, prevented the research from being carried out on the full scale which was desirable. The difficulties were considerable. Not only the preparation of the pure materials required for the experiments to be undertaken, but methods of producing the metals had had to be studied and special apparatus developed and constructed. Fundamental difficulties had arisen, too, from the very high temperatures employed. It could, however, be confidently anticipated that the abandonment of the old method of trial and error by which this field had been explored in past years in favour of scientific research would yield important results.

Sir Robert Hadfield said the iron and steel industry would look forward to obtaining not merely information valuable from the scientific standpoint, but knowledge which could be applied in practical work.

Professor C. H. Desch reminded the meeting that the work of research now in hand was so difficult that a somewhat similar investigation had been abandoned by American workers.

Dr. W. H. Hatfield regarded the problem that was being attacked—the relation of oxygen to iron—as the most important on the technical side with which steel manufacturers were confronted at the present time.

Alleged Fraudulent Chemical Deal

At the Manchester City Police Court on September 4, Harold Stanley Davenport, of Old Trafford, Manchester, was charged with incurring a debt or liability to the extent of £13 17s. 6d. by means of fraud other than false pretences. It was alleged in the course of police evidence that the accused, who was apprehended on September 3, telephoned to a Manchester firm of chemical merchants on August 7 and asked the price of Epsom salts, stating during the conversation that he had been recommended to them by another firm. When he was told that the price was £4 15s. per ton, the accused asked the firm if, in order to get the business, they could not make it £4 12s. 6d. per ton. This was agreed to and two days later three tons of Epsom salts were supplied at the price quoted. It was alleged, however, for the prosecution, that Davenport shortly afterwards re-invoiced the consignment to another firm at £3 10s. per ton and was paid £10 10s. by them on August 11. It was stated that, when arrested, among the papers found on the accused was a list of names of other business houses. Davenport, who stated that he had a complete answer to the charge, was remanded till September 12, bail being refused.

Standardisation of Scientific Glassware

Joint Committee's Recommendations

THE Joint Committee for the Standardisation of Scientific Glassware, working under the ægis of the Institute of Chemistry, have given careful consideration to the question of units of volume and have issued a report embodying their recommendations.

Standards of Accuracy

A further question to which the Committee have devoted considerable time is the accuracy of volumetric glassware. It was considered that two grades of volumetric glassware, and two only, are desirable and necessary namely: Class A or standard apparatus. This must be of the highest accuracy reasonably attainable, of best quality materials and workmanship, and each vessel should be tested and approved by an impartial institution before being accepted as of standard grade. The National Physical Laboratory is the appropriate institution in this country for carrying out the tests.

Class B or commercial grade apparatus is a cheaper quality apparatus for general use, but guaranteed by the manufacturer to conform with definitely recognised limits of accuracy and other necessary requirements.

The specification for Class B apparatus must necessarily be less stringent than for Class A apparatus and should, for the sake of economy, make the minimum demands on the manufacturer consistent with satisfactory service for work in which commercial grade apparatus may reasonably be employed.

The Committee consider that the regulation for the Class A tests and Class B tests on volumetric glassware laid down by the National Physical Laboratory form a satisfactory basis for the two grades of apparatus. These regulations are contained in a laboratory test pamphlet (see THE CHEMICAL AGE, September 6) which has recently been revised, and the National Physical Laboratory has afforded the Committee the fullest opportunity of co-operating in the revision.

Manufacturers' Guarantee

The manufacturers' representatives on the Committee have agreed to supply, in addition to standard Class A apparatus tested at the National Physical Laboratory, Class B apparatus guaranteed by themselves. They will undertake to replace any article so guaranteed and found not to fulfil the requirements of the National Physical Laboratory regulations for Class B apparatus, with apparatus tested at the National Physical Laboratory and bearing the laboratory mark signifying that it complies with the Class B requirements. No charge will be made by the manufacturers for any such replacements.

The sale, purchase, or use of volumetric apparatus inferior in quality to Class B apparatus is detrimental to the best interests of all concerned, and the Committee hope to see the elimination of all such inferior apparatus. Candidates for examination, in particular, should be entitled to put confidence in the accuracy of the apparatus with which they are provided, and if they are given inferior apparatus they are liable to suffer grave injustice in the assessment of their work by reason of errors which lie outside the scope of their own manipulation.

Advice to Purchasers

The success of the Committee's efforts must ultimately depend upon the action taken by purchasers of volumetric glassware. The Committee would, therefore, urge upon educational authorities and institutions the desirability, when they are purchasing volumetric glassware, of specifying either (*a*) That the apparatus must have passed the Class A tests at the National Physical Laboratory and be accompanied with a laboratory certificate; or (*b*) that the apparatus must have passed the Class A tests at the National Physical Laboratory—certificate of corrections not required; or (*c*) that the apparatus must have passed the Class B tests at the National Physical Laboratory; or (*d*) that the apparatus must be guaranteed by the vendor to comply with the National Physical Laboratory regulations for Class B tests.

The alternative adopted will, of course, depend upon the purpose for which the apparatus is required.

The Joint Committee fully realise that for elementary teaching purposes economy in initial outlay on apparatus is a necessity. They feel confident, however, that, subject to a satisfactory demand, manufacturers will be able to supply guaranteed Class B apparatus at prices consistent with reasonable economy. They also believe that it will be found ultimately more economical for advanced work and ressearch, for which apparatus of doubtful accuracy cannot be tolerated and calibration is essential, to purchase tested Class A apparatus rather than to purchase untested apparatus and invariably carry out a calibration after purchase.

Finally, the Committee would urge most strongly that under no circumstances should orders for volumetric glassware be placed without definite limits of error being specified, as failure to do so tends to encourage the production of inferior apparatus in which quality and accuracy are unduly sacrificed for cheapness. Some of the cheaper calibrated apparatus is known to be so inaccurate as to lead to grave errors even in the most simple determinations. The Committee believe it will be found that the simplest and most satisfactory way of specifying limits will be to refer to the National Physical Laboratory tests.

New Technical Publications

ERNEST BENN, LTD., announce for publication this month the first volumes of their new Chemical Engineering Library, a series of concise monographs to serve as up-to-date and systematic reference books to the chemical engineer. An attempt has been made to sectionalise the more important sides of the science and practice of the subject, and the first titles announced are "The Technology of Water," by Alan A. Pollitt, M.Sc.; "Distillation Principles," by C. Elliott, B.Sc., A.M.Inst.M.E., A.M.Inst.C.E.; "Grading and Screening of Materials," by J. E. Lister, A.M.Inst.C.E., A.M.Inst.M.E.; "Grinding and Crushing Machinery," by Hartland Seymour, consulting engineer: and "Acid Concentration Plant" in two volumes, by P. Parrish, A.I.C., and F. C. Snelling.

A new departure of importance in the literature of technical chemistry is marked by the same firm, which has issued this week "The Synthesis of Nitrogen Ring Compounds Containing a Single Hetero-atom (Nitrogen)," by Cecil Hollins, B.Sc., A.I.C., with an introduction by Professor J. B. Cohen, F.R.S. This book is a comprehensive monograph on a restricted subject, which should appeal, as filling a very real gap, to all engaged in the synthesis of organic compounds, whether for industrial or for purely academic purposes. The subject is confined to what is undoubtedly the more important group of ring compounds of nitrogen, and therefore a complete survey has been possible of the methods by which cyclic compounds containing a single hetero-atom (nitrogen) have been prepared.

Mercury Poisoning

As the result of a study of workers in laboratories and industrial factories, Dr. J. A. Turner, of the United States Public Health Service, has discovered that daily exposure to an atmosphere containing as small a quantity as 0·02 mg. of mercury per cubic foot of air results in signs and symptoms of poisoning. The tests indicate that daily exposure must continue for two or three months before symptoms appear. It is estimated that in exposure to the above quantity of mercury for three to five hours daily there is a total daily absorption of mercury ranging from 0·771 to 1·285 mg. The recommended solution is intended to make it impossible for the workmen to inhale the mercury fumes.

The Market for Dyestuffs in Japan

A CONFIDENTIAL report on the market for dyestuffs in Japan during 1923 has been prepared in the Department of Overseas Trade from information received from the Acting Commercial Counsellor at Tokyo (Mr. G. B. Sansom) and issued to firms whose names are entered upon its Special Register. Recent regulations made in Japan regarding the importation of dyestuffs are also enclosed with the report.

United Kingdom firms desirous of receiving a copy of this report, together with full particulars of the Special Register service of information and form of application for registration, should communicate with the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1.

From Week to Week

THE DOMINION TAR AND CHEMICAL CO. is to erect large works in St. Boniface, Man., U.S.A.

WHITBY URBAN DISTRICT COUNCIL is considering a loan of £27,000 for sewage disposal works.

THE ANGLO-SCOTTISH SUGAR BEET CORPORATION, LTD., proposes to erect a £300,000 factory at Spalding.

DR. J. S. HALDANE, F.R.S., will take over the Presidency of the Institution of Mining Engineers on October 2.

MR. THOMAS HOLLAND, a governor of Wigan Mining and Technical College, has accepted the mayoralty of Wigan.

EXTENSIVE CHEMICAL AND DYESTUFFS exhibits will be a feature of Liverpool s Civic Week at Wembley from September 18 to 25.

FOR DAMAGE TO AMERICAN OIL WELLS in Roumania during the war the American Standard Oil Co. is claiming 10 million dollars from Germany.

UNEMPLOYMENT IN THE GERMAN DYE INDUSTRY is estimated at 8,000 workers—about 15 per cent. of the number engaged in the industry.

MR. GODFREY CLAXTON has been appointed Research Assistant to the Joint Benzol Research Committee of the National Benzol Association and the University of Leeds.

IN 1919 Great Britain held 80 per cent. of the Moroccan market for ordinary soap, but last year this proportion had dropped to roughly 3 per cent., France securing 96 per cent.

MR. JAMES HORNE, who has just retired from active service with Vickers, Ltd., joined the Barrow factory in 1898 as chief hydraulic engineer. He will continue to assist the firm in an advisory capacity.

AN OIL SEPARATOR VESSEL was on September 5 launched at Portsmouth. It was built locally and designed to work an invention which, it is said, will prevent the nuisance of waste oil on water.

THIS YEAR MARKS THE JUBILEE of the first commercial production of salicylic acid. In 1874 was established the first factory for this purpose—that of von Heyden, A.G., in Dresden-Radebeul.

AMMONIA FUMES caused by the explosion of a compressor in a refrigerating plant at the works of a Birmingham firm resulted in two employees and two firemen being taken to hospital on Tuesday.

THE SCIENTIFIC GLASS BLOWING CO., Manchester, have completed arrangements for transferring their works and office to 12 and 14, Wright Street, Oxford Road, adjacent to the University of Manchester.

A TENDER OF £547 19s. 6d. made by Gowthorpe, of Selby, to Howden Guardians, for providing sewage storage and liquefying tanks and continuous bacterial filter and other sewerage plant, has been accepted.

MR. JOHN WRIGHT, analytical chemist, of The Avenue, Linthorpe, Middlesbrough, was on Saturday, September 6, admitted to the North Riding Infirmary suffering from injuries caused by his motor cycle skidding.

PHOSPHATE DEPOSITS HAVE BEEN DISCOVERED in Sierra de Espuña, according to reports from Spain. The deposits are estimated to contain millions of tons of phosphates, and a company is to be formed to work them.

AN OFFICIAL ANNOUNCEMENT is published of the dissolution of the partnership between Mr. B. E. Coke and Dr. E. B. Maxted, chemists for the purpose of industrial research, at Manor Road, Penn, Wolverhampton, under the style of Coke and Maxted.

THE CHEMICAL DIPPING of 400,000 sheep in North Wales, which was completed on Saturday, illustrates the extent to which the prejudice against scientific methods has been overcome, and the growth of the farmer's dependence on chemical help.

A PETITION signed by nearly 200 residents in the vicinity of the works of David Hinchliffe and Son, oil extractors, of West Mills, Battyeford, has not been successful, and the Mirfield (Yorks) Urban Council has confirmed its previous decision to close the works.

REPORTS STATE THAT an important German oil combine has concluded an agreement with a Russian oil company, providing for oil deliveries for Germany in the same amount as before the war. Russia's import will consist chiefly of benzene and oil by-products.

THE AMERICAN BY-PRODUCTS CORPORATION contemplates the erection of a lignite carbonising plant with a capacity of 250 tons daily. The final plant will have a daily capacity of 2,000 tons of dry lignite. The process is known as the Gorden multiple-unit retort process.

MR. C. B. MARSON has been elected to the Gas Research Fellowship of the Institution of Gas Engineers, which is held in the Department of Coal Gas and Fuel Industries in the University of Leeds for research in gas problems under the supervision of Professor Cobb.

MEMBERS of the Institute of Metals paid a visit on Wednesday evening to the National Physical Laboratory, Teddington, and saw demonstrations of the work done in the departments of metallurgy, engineering, physics, and electrotechnics, and in the William Froude tank.

PROFESSOR T. TURNER, M.Sc., speaking at the opening session of the Institute of Metals on Tuesday, said he was able to announce a donation of £1,000 towards an endowment fund for the Institute. The gift is from one who has done much for the Institute, but who does not desire publicity.

AT THE INQUEST on Dr. Albert Haworth, M.Sc., M.B., Ch.B., lecturer in Chemical Pathology at Manchester University, it was stated that death was due to pneumonia following infection contracted through a scratch from a rib during a post-mortem examination. Dr. Haworth was recently appointed Lecturer on Pathology at Leeds University.

MR. JAMES MUNN, of Cleveland, U.S.A., the district manager of *Chemical and Metallurgical Engineering*, has just concluded a three months' visit to Europe and left for New York on Wednesday. Mr. Munn made several chemical acquaintances during his visit, and returned with very pleasant impressions of his stay, especially in England.

THE LATE SIR MILTON SHERIDAN SHARP, chairman of the Bradford Dyers' Association, left unsettled property of the gross value of £219,528, with net personalty £206,350. His will stated that he left only a few bequests to charities "because in my lifetime I have tried to recognise that all our doings without charity are nothing worth by giving freely of my substance to such institutions and causes as appealed to me as far as ever possible anonymously."

IN RESPONSE TO recommendations of the medical profession for a universally used article of diet containing iodine, The Canadian Salt Company, Ltd., Windsor, Ont., has, with the approval and advocation of the Ontario Provincial Board of Health, produced a table salt containing a very minute quantity of iodine. This is considered the simplest way of making up the lack of iodine in the diet and thus helping to check the increase of cases of simple goitre. The iodine is included by introducing 0·01 per cent. potassium iodide.

THE AGREEMENT reached on August 14 at Basle between the German Potash Syndicate and the Société Commerciale des Potasses de l'Alsace was signed by both parties on August 27. This agreement regulates the sale of potash to the United States, the allocation giving German producers 62½ per cent. of American requirements and the remainder or 37½ per cent. to be filled from Alsatian mines. Earlier reports had erroneously stated that the German mines would supply 67½ per cent. of American requirements. The agreement is to extend for three years.

COURSES in metallurgy, assaying, metallography, etc. form an important feature of the programme for the coming session in the Chemistry and Metallurgy Department of the Chelsea Polytechnic. There are day classes provided for those wishing to become industrial or analytical metallurgists, assayers, and so on, and those wishing to take university degrees with a diploma in metallurgy, while evening classes are also arranged for the benefit of those employed during the daytime who wish to acquire a knowledge of metallurgical processes. There are several evening courses to suit different needs, and special arrangements can be made with employers to give instruction of a suitable nature. The classes are organised by Mr. J. B. Coleman, F.I.C., and Mr. W. A. Naish, A.I.C., M.Inst.M.M., M.Inst.M.

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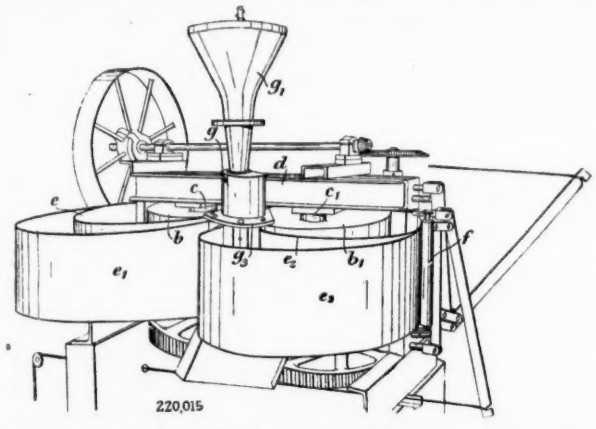
Abstracts of Complete Specifications

220,011. ALUMINIUM HYDROXIDE, MANUFACTURE OF. The Amber Size and Chemical Co., Ltd., 61, St. Mary Axe, London, E.C.3. From G. Muth, 20, Wetzendorferstrasse, Nurnberg, Germany. Application date, February 27, 1923.

It is known that natural double silicates or silico-aluminates such as potassium feldspar or sodium feldspar may be decomposed by treating them with caustic alkalies or alkali carbonates under a pressure of 18 to 20 atmospheres, and it is also known that aluminium silicates such as china clay may be decomposed by boiling with caustic alkali at atmospheric pressure. In this invention, natural aluminium silicates such as china clay are heated with caustic alkalies or alkaline earths or their carbonates in the presence of water in a closed vessel to a temperature which produces a pressure of 3 to 4 atmospheres. The china clay and alkali may be first heated with water to boiling point to obtain alkali-aluminium silicates, which are readily decomposed, and these silicates may then be heated with a further quantity of alkali in a closed vessel to a pressure of 3 to 4 atmospheres. In an example, a mixture of china clay containing 40 per cent. Al_2O_3 100 parts, and caustic soda containing 30 to 37 parts of Na_2O, is boiled at atmospheric pressure for some time, and finally at 3 to 4 atmospheres pressure. The resulting alkali metal silicate is separated from the alumina, which may be converted into aluminates, aluminium salts or aluminium. The process may be modified by omitting the water and heating to similar temperatures.

220,015. SEPARATING SOLIDS FROM LIQUIDS. O. Soderlund, T. Boberg and Techno-Chemical Laboratories, Ltd., "Fairlawn," Clarence Road, Clapham Park, London, S.W.4, and N. Testrup, 47, Victoria Street, London, S.W.1. Application date, March 7, 1923.

This apparatus is of the kind in which liquid is expressed from moist material by passing it between rolling surfaces. If the rollers are small in diameter, the wedge-shaped space by which the material enters the rollers is wide in proportion to its length, and the angle between the roller surfaces is considerable. The material is thus only properly gripped between the two surfaces when it is close to the point of contact, and the amount carried through is very small. The quantity treated may be increased by increasing the diameter of the rollers, but this would involve an apparatus of very large size. In this invention, the output is increased by providing an endless band which travels between the rollers and divides the material treated into separate layers. An additional surface is thus

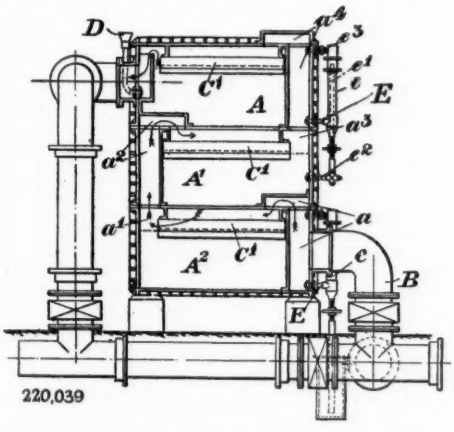


provided in contact with the material, which exerts a frictional grip upon it and carries a large quantity through the rollers. The decrease in the angle between the moving surfaces also increases the quantity of material carried through. A number of such endless bands may pass between the same pair of rollers, so that the angle of entry is still further reduced, and the moving surface increased. As an example, when using two rollers each having a diameter of 20 in. for treating raw peat, an output of 5 kilogrammes of solid per hour per lineal metre surface was obtained; when a ring or band having a diameter of 24 in. was placed around one of the rollers the output was increased about four times.

Two rollers b, b^1, are mounted on vertical shafts, c, c^1, carried by horizontal members d. The roller b is surrounded by two endless flexible bands e, e^1, and the roller b^1 is surrounded by two similar bands e^2, e^3, these bands being guided by rollers f. The material to be treated, such as peat, is fed from a hopper g^1 through a chamber g to a central space between upper and lower plates g^3. The upper plate g^3 has a sector-shaped aperture through which the material passes to the spaces between the bands. Scrapers may be provided upon the outlet side of the rollers to remove the dried material from the bands. It is found that the best results are given by feeding the material on to the central portion of the rollers. The rollers may be heated internally by means of hot gases, steam or recompressed vapour generated from previously treated material. The apparatus is suitable for obtaining oils, fats, etc., from seeds.

220,039. WASHERS OR PURIFIERS FOR USE IN THE MANUFACTURE OF GAS. Firth Blakeley, Sons and Co., Ltd., Church Fenton, near Leeds, and J. C. Wright, The Gasworks, Nursery Walk, Romford, Essex. Application date, May 2, 1923.

This apparatus consists of a number of Livesey tube washers arranged one above the other in the form of a tower, the crude gas passing up through the washers and the washing liquor passing downwards. Three such washers, A, A^1, A^2, are shown arranged one above the other, and the crude gas is delivered through a pipe B to a chamber a. This chamber



communicates with the space above the usual pear-shaped tubes and channels C^1, which extend along the top of the chamber A^2. When starting operations, the level of the liquid in the washer A^2 is just above the tops of the perforated tubes, so that the gas passes between the channels C^1, and depresses the liquid so that it rises within the channels. The gas then passes through the perforations in the tubes and through the liquid into the channels C^1. Next it goes through a passage a^1 into the gas chamber a^2 of the second washer, through which it passes in a similar manner to the top washer A. The washing liquor is admitted at an inlet D, and each washer is provided with an overflow pipe E leading to a vertical pipe e containing a central pipe e^1, which controls the liquid level in the chamber. The liquid overflowing into the pipe e^1 passes into the chamber next below through a pipe e^2. The length of the pipe e^1 may be varied by means not shown, to regulate the liquid seal in each washer. In this manner the perforated washing tubes are kept clear of tar, which passes off through the overflow pipes.

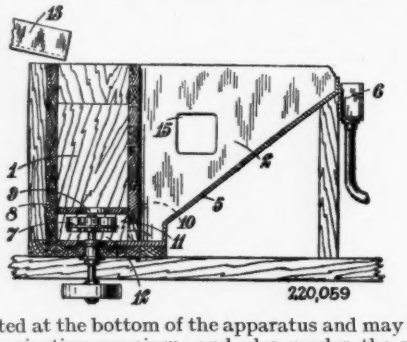
220,043. PHENOL ALDEHYDE CONDENSATION PRODUCTS. H. V. Potter and the Damard Lacquer Co., Ltd., 82, Victoria Street, Westminster, London, S.W.1. Application date, May 2, 1923. Addition to 131,112.

When phenol aldehyde condensation products are used for producing electric insulating material, such material is some-

times contaminated with excess of the reagents used, or with impurities. In this invention, the condensation product is dissolved in alkali and precipitated with acids, and the pure resinous substance thus obtained is dissolved in a solvent consisting of methylated spirit containing 5 per cent. of acetone. The varnish thus obtained is used for impregnating fibres or other material.

220,059. CONCENTRATION OF ORES AND THE LIKE, APPARATUS FOR. F. B. Jones, B. L. Bourke, and Minerals Separation, Ltd., 62, London Wall, London, E.C.2. Application date, May 7, 1923.

This froth flotation apparatus is of the type in which a number of agitation boxes are arranged size by side with a corresponding series of spitzkasten in front of them. Each spitzkasten has an inlet opening from one agitation box, and an outlet opening to the adjacent agitation box, so that the pulp flows from each agitation box to the next through the adjacent spitzkasten, and so on through the series. In such apparatus, when the agitation is stopped, the suspended solids



are deposited at the bottom of the apparatus and may obstruct the communicating openings, and also render the rotatable agitator difficult to restart. The diagram shows a vertical transverse section through one agitation box 1 and the adjacent spitzkasten 2. Each box is provided with rotatable agitators 7, working in a confined space between the bottom of the box, and a horizontal partition 8 having an air inlet 9. Each box is provided with an inlet opening 10 from one of the spitzkasten, and an outlet opening 11 to the adjacent spitzkasten, the latter being staggered with respect to the agitation boxes for this purpose. The agitators 7 are eccentrically arranged, so that they are nearer the inlet than the outlet openings 11. The pulp leaves the last spitzkasten through an upwardly directed pivoted pipe, so that the level of pulp in the apparatus may be controlled. The uniform height of liquid in the apparatus is ensured by openings 15 in the partitions between the spitzkasten. When the apparatus is stopped, the solids tend to settle partly on the partitions 8, and partly in the space 12 below the agitators.

220,157. FILTERING APPARATUS. E. W. W. Keene, Holmer Mansions, South Road, Weston-super-Mare. Application date, August 1, 1923.

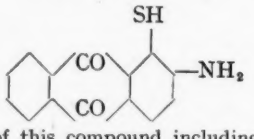
In filtering apparatus of the continuous rotary kind, the thickness of the filter cake on the rotating drum is kept uniform by means of a rounded strip of metal arranged parallel to the axis of the drum, so that the rounded surface presses against the solid material which covers the drum. The strip is pivotally mounted, and is provided with a screw adjustment to regulate its distance from the drum. A uniform dryness of the material is thus obtained upon reaching the scraper or knife which removes it from the drum.

220,212. GREEN VAT DYESTUFFS, MANUFACTURE AND PRODUCTION OF. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, December 3, 1923.

It is known that dibenzanthrone can be transformed by nitration into a derivative which can be employed as a green vat dyestuff. It has now been found that the nitration product of dibenzanthrone is not uniform, but may be separated into a clearer green vat dyestuff than the original, and a greenish-grey dyestuff. To effect this separation, the nitration product is dissolved in concentrated sulphuric acid, and dilute sulphuric acid is then added to fractionally precipitate the desired product. The properties of this product differ from those of the original, and it dissolves in concentrated sulphuric acid to a brighter bluish-violet colour than the original. Further, the new product after treatment with anhydrous aluminium chloride and nitrobenzene still gives green dyeings which turn black on exposure to dilute hypochlorite solution. The raw nitration product after similar treatment dyes bluish grey, which is not affected by treating with hypochlorite.

220,216. VAT DYESTUFFS OF THE ANTHRAQUINONE SERIES, MANUFACTURE AND PRODUCTION OF. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, December 6, 1923.

It is known that anthraquinone vat dyestuffs containing a thiazole nucleus may be obtained by treating 1-mercapto-2-amino-anthraquinone or a substitution product with a compound capable of introducing the oxalic acid residue. It is now found that dyestuffs of this class can be obtained by condensing 1-mercapto-2-amino-anthraquinone of the formula :—



or a derivative of this compound including the disulphide corresponding to the mercapto compound, with glyoxal. Glyoxal may be employed as the bisulphite or sulphate, which may be obtained by the action of fuming sulphuric acid on symmetrical tetrahalogen-ethane.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—201,575 (Farbenfabriken vorm. F. Bayer and Co.), relating to the production of dyestuffs of the anthraquinone series, see Vol. IX, p. 377 ; 203,340 (M. Rascher and R. Plaueln), relating to the production of white lead, see Vol. IX, p. 521 ; 208,720 (Compagnie Nationale de Matière Colorante et de Produits Chimiques), relating to the manufacture of a dyestuff from naphthidine, see Vol. X, p. 202 ; 215,374 (Farbwerke vorm. Meister Lucius and Brüning), relating to a process of making methane, see Vol. XI, p. 46 ; 216,478 (Naugatuck Chemical Co.), relating to a reaction product of acetaldehyde and aniline, see Vol. XI, p. 124.

International Specifications not yet Accepted

218,629. ALUMINIUM SULPHATE. Amber-Size and Chemical Co., Ltd., 61, St. Mary Axe, London. (Assignees of G. Muth, 20, Wetzendorferstrasse, Nuremberg, Germany.) International Convention date, July 2, 1923.

A paste of kaolin and water is treated with concentrated sulphuric acid, and the heat generated raises the temperature sufficiently to effect the reaction. The last portion of acid may be neutralised by burnt kaolin, bauxite, aluminates, magnesia or magnesite.

218,638. SYNTHETIC RESINS. C. O. Terwilliger, 630, Hanover Place, Mt. Vernon, New York. International Convention date, July 5, 1923.

To obtain fusible and soluble, fusible or insoluble, or infusible and insoluble resins, a ketone such as light or heavy anthracene oil, and a phenolic body are condensed with formaldehyde, paraformaldehyde, hexamethylene-tetramine or furfural. Suitable phenols are phenol, the cresols, xylols, mono-, di-, or trihydric phenols, and phenol alcohols. Alkaline or acid condensing agents are used, preferably alkaline hydroxides or carbonates. The products are suitable for making varnishes, electric insulation, and for moulded articles.

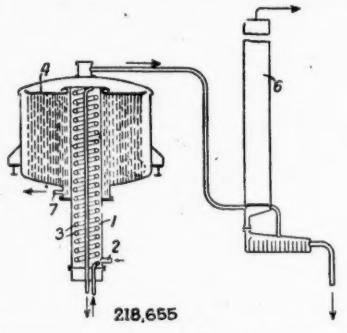
218,662. DEHYDRATING ALCOHOL. Distilleries des Deux-Sèvres (formerly Soc. Ricard, Allenet et Cie.), Melle, Deux-Sèvres, France. International Convention date, July 6, 1923.

Specification 211,454 (see THE CHEMICAL AGE, vol. X., p. 446) describes the dehydration of alcohol by adding another liquid having certain properties, and then distilling it. The added liquid may be a mixture of benzene and gasoline boiling at 100° C., or gasoline itself, or ethyl acetate. In the last two cases water may be added to the distillate. Where

gasoline is used, a more complete separation of gasoline from the lower layer is thus effected, and where ethyl acetate is used the water is added to effect the separation into two layers.

218,655. DISTILLING LIQUIDS. Koppers Coke Oven Co., Ltd., 301, Glossop Road, Sheffield. (Assignees of H. Koppers, 29, Moltkestrasse, Essen, Germany.) International Convention date, July 5, 1923.

A mixture of benzol and washing oils passes through an inlet 2 into a heating chamber 1 containing a steam coil 3,



and the heated liquid is discharged on to a distributing plate 4. The liquid falls in thin streams through the evaporating chamber to the outlet 7, and the vapour passes to a condenser 6.

218,972. ZINC CARBONATES. A. Nathansohn, 6, Goslarische-strasse, Bad Harzburg, Germany. International Convention date, July 9, 1923.

Zinc chloride solution or a suspension of sal-ammoniac skimmings from galvanizing may be treated with lime and carbon dioxide to convert the zinc into carbonate, which is then washed.

218,981. CHROMIUM, MOLYBDENUM, TITANIUM, TUNGSTEN, AND VANADIUM SALTS, PURIFYING. A. Wittig, 12, Fürtherstrasse, Berlin. International Convention date, July 12, 1923.

Solutions of salts of chromium, molybdenum, titanium, tungsten or vanadium are obtained free from arsenic and phosphorus by adding the necessary quantity of zirconium hydroxide, carbonate, basic sulphate or other salt, or a crude zirconium product containing silica, titanium, etc. The salts thus obtained are converted into the pure metals which may be employed to obtain alloys with iron.

218,982. SOLVENTS FOR MEDICAMENTS. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, July 14, 1923.

Medicaments which are insoluble or sparingly soluble in water may be dissolved in a mixture of a water-soluble carbonic acid ester with a water-soluble alkyl or alkylene substituted urea. In an example, a 10% solution of diallylbarbituric acid is obtained in a mixture of monoethyl urea 10 parts, urethane 10 parts, and water 5 parts. Solutions may also be obtained of diethylbarbituric acid, phenylethylbarbituric acid, camphor, quinine, paraldehyde, and sandalwood oil. Other solvents employed are carbonic acid allyl and propyl esters, monomethyl urea, asymmetrical diallylurea, di-isobutylurea, and symmetrical dimethylurea.

218,992. CATALYSTS FOR AMMONIA SYNTHESIS. Norsk Hydro-Elektrisk Kvaelstofaktieselskab, Christiania. International Convention date, July 14, 1923.

These catalysts are obtained by treating a compound of a metal of the iron group, *e.g.*, anhydrous ferric or ferrous chloride with dry potassium cyanide and anhydrous liquid ammonia. The excess of ammonia is boiled off, and the residue heated in a non-oxidising atmosphere.

LATEST NOTIFICATIONS.

221,205. Manufacture of improved artificial shellac. Society of Chemical Industry in Basle. August 30, 1923.

221,226. Process for the preparation of thymol from 2-cymedine. Austerweil, G. August 31, 1923.

221,227. Process for the preparation of thymol from *p*-cymene. Austerweil, G. August 30, 1923.

221,229. Methods of and apparatus for the carrying out of catalytic reactions. Synthetic Ammonia and Nitrates, Ltd. September 1, 1923.

Specifications Accepted, with Date of Application

202,283. Sulphur, Burning of. Texas Gulf Sulphur Co. August 8, 1922.

205,100. Distillation of carbonaceous substances. Kohlenveredlung Ges. October 5, 1922.

214,196. Illuminating or coke oven gas or similar gases, Preliminary treatment or purification of. Soc. L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. April 10, 1923.

220,710. Alloys. H. Etchells, A. Popplewell, and L. Cameron and Son, Ltd. May 22, 1923.

220,714. Classification and concentration of ore-bearing material, Apparatus for. J. F. Newsum. May 23, 1923.

220,716. Recovery of values from mixtures containing the same, Processes for. B. E. Eldred. May 23, 1923. Addition to 199,753.

220,720. Leaching systems, particularly for copper. W. G. Perkins, T. J. Taplin, and Metals Production, Ltd. May 24, 1923.

220,721. Esters, Manufacture of. H. Wade. (*S. Karpen and Bros.*) May 24, 1923.

220,732. Cracking of hydrocarbon oils and the treatment of solid carbonaceous substances. T. M. Davidson and G. P. Lewis. May 26, 1923.

220,771. Hydrocyanic acid, Catalytic production of. J. Y. Johnson. (*Badische Anilin & Soda Fabrik.*) July 5, 1923.

220,791. Acid proof alloys. M. Dreifuss. August 1, 1923.

220,807. Ammonia, Process for the production of. W. A. Nelson. August 20, 1923.

220,664. Liquid hydrocarbons, Treatment of. S. J. M. Auld, A. E. Dunstan, and P. H. Herring. February 20, 1923.

220,668. Organic arsenic compounds, Process for the production of. O. Margulies. February 23, 1923.

220,676. Gas manufacture. H. Nielsen and B. Laing. March 21, 1923.

193,851. Desulphurising iron, steel, ferro alloys, and copper, Process of. Chemical Treatment Co. February 22, 1922.

196,922. Metalliferous pulp, Process and apparatus for treating R. Thayer. May 1, 1922.

Applications for Patents

Blackshaw, H., British Dyestuffs Corporation, Ltd., Horsfall, R. S., and Laurie, L. G. Dyeing, etc., wool and fur. 21,086, 21,087. September 6.

Caspari, F. Distillation of bituminous substances. 20,704. September 2. (Germany, October 24, 1923.)

Coley, H. E. Manufacture of zinc. 20,920. September 4.

Compagnie de Béthune. Production of ethylsulphuric acid. 21,032. September 5. (France, September 7, 1923.)

Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord, Réunies, Etablissements Kuhlmann. Process for manufacture of perylene. 20,693. September 2. (France, December 20, 1923.)

Crowe, T. B., and Mills, L. D. Precipitating and filtering. 20,832. September 3.

Crowe, T. B. Recovering cyanogen from solutions. 20,833. September 3.

Dynamidon-Werk Engelhorn and Co., Ges. Production of fireproof magnesite. 21,105. September 6. (Germany, September 14, 1923.)

Heyl, G. E. Mineral pigments. 20,749. September 3.

Heyl, G. E. Heating and distillation of liquids and solids, etc. 20,750. September 3.

Howles, F., and McDougall, I. Manufacture of insecticides, etc. 20,696. September 2.

Melamid, M. Process of liquefying carbon. 21,019. September 5. (Germany, June 17.)

Norsk Hydro-Elektrisk Kvælstofaktieselskab. Apparatus for synthetic production of ammonia. 20,689. September 2. (Norway, September 28, 1923.)

Philipp, H., and Sutherst, W. F. Manufacture of colloidal sulphur. 20,998. September 5.

Rack, R. S. Manufacture of liquid glue. 21,042. September 6.

Sauer, J. N. A. Activated carbon for purification of water, etc. 20,793. September 3.

Sauer, J. N. A. Activated carbon for medicinal purposes. 20,905. September 4.

Smith, E. Chemical fire-extinguishers. 21,064. September 6.

Synthetic Ammonia and Nitrates, Ltd. Carrying out catalytic reactions. 20,572. September 1. (United States, September 1, 1923.)

Synthetic Ammonia and Nitrates, Ltd. Production of nitric acid from ammonia. 21,066. September 6. (United States, September 6, 1923.)

Synthetic Ammonia and Nitrates, Ltd. Process of producing ammonium nitrate. 21,067. September 6. (United States, September 6, 1923.)

Tagliabue, J. Manufacture of explosives. 20,936. September 4.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing those firms' independent and impartial opinions.

London, September 11, 1924.

BUSINESS during the past week has been quite satisfactory with one or two products showing a firmer tendency and demand broadening.

Export business still remains quiet, although a greater volume of inquiry has been received.

General Chemicals

ACETONE is firmer and stocks are none too heavy. Price, however, shows no change at £100.

ACETIC ACID continues firm with 80% Technical at £44, and 80% Pure at £45.

ACID CITRIC.—Slightly easier and only in very moderate demand.

ACID FORMIC shows no change in price with small inquiry on the market.

ACID LACTIC.—Fair inquiry has been received and price is steady at £43 per ton for 50% weight.

ALUMINA SULPHATE.—Dull, price remains in buyers' favour at £7 10s. for 17/18%.

ARSENIC.—A fair amount of inquiry is being received and price shows no change at between £46 and £48 per ton, according to quantity and position.

BARIUM CHLORIDE continues firm with makers very well occupied and price very firm at £14 to £14 10s. per ton.

COPPER SULPHATE.—A fair amount of business has been booked and there is a large amount of inquiry on the market for next season's requirements, price steady at £23 per ton.

CREAM OF TARTAR.—In small request at 80s. per cwt., less 2½%.

FORMALDEHYDE.—Only in small request and price shows no change at £52 to £53 per ton delivered.

LEAD ACETATE is in good request at £47 10s. per ton.

LEAD NITRATE.—No change, demand small at £43 per ton.

LIME ACETATE.—Only small inquiry is being received and price about £18 per ton.

METHYL ALCOHOL is in good request and price firm at £65 per ton.

POTASSIUM CARBONATE AND CAUSTIC are quiet and show no change in prices.

POTASSIUM PERMANGANATE is easier at 7¼d. per lb.

POTASSIUM PRUSSIATE has met with fair inquiry and stocks are not very heavy. Price remains steady at 7¾d.

SODIUM ACETATE is only in small request and price shows no change at £23 10s. to £24.

SODIUM HYPOSULPHITE is in slightly better demand, price unchanged at £9 10s. per ton for commercial quality.

SODIUM NITRITE in fair demand at £25 to £25 10s. per ton.

SODIUM PRUSSIATE.—Better business is reported and price shows no change at 4¼d.

SODIUM SULPHIDE in good demand for export at £14 to £15 per ton.

Coal Tar Products

There is little change in the market for coal tar products to report from last week.

90% BENZOL is steady at 1s. 6½d. to 1s. 7d. per gallon on rails.

PURE BENZOL remains unchanged at 1s. 11d. to 1s. 11½d. per gallon on rails.

CREOSOTE OIL is still quoted at from 5½d. to 5¾d. per gallon on rails in the North, and 6d. to 6¼d. per gallon in London.

CRESYLIC ACID.—The Pale quality 97/99% is quoted at 1s. 11d. to 2s. per gallon on rails, and the Dark quality 95/97% at 1s. 8d. to 1s. 9d. per gallon.

SOLVENT NAPHTHA is worth from 11d. to 11½d. per gallon on rails.

HEAVY NAPHTHA is quoted at from 10d. to 11d. per gallon on rails.

NAPHTHALENE.—The lower grades are worth £4 10s. to £5 per ton on rails, while 76/78 quality is quoted at £7 10s. per ton, and 74/76 at from £5 15s. to £6 5s. per ton.

PITCH.—The market remains dull with quotations at 55s. to 57s. 6d. f.o.b. London, and 52s. 6d. to 55s. f.o.b. East and West Coast Ports.

Nitrogen Products Market

THE market for sulphate of ammonia has continued firm during the past fortnight—and prices have remained at about £13 5s. to £13 10s. per ton prompt, and £14 and upwards for forward delivery, f.o.b. U.K. port.

Quite a good demand is being experienced at the above prices for home trade, and it is confidently expected that in view of the healthier position in the export market makers will raise their prices for home use during the remainder of the season.

A factor which may play an important part in regard to price is the heavy diminution in the coke oven production brought about by slackness in the iron and steel trade.

Nitrate of soda remains much as before. The spot price for cargoes has receded somewhat to about £11 8s. per ton, but forward is firm at £12 c.i.f. European ports.

Metal Spraying Developments

AT the concluding session of the Conference of the Institute of Metals on Wednesday, Messrs. T. Henry Turner and W. E. Ballard described the process of metal-spraying which is now being used for coating various objects with thin films of metal. A wire of the metal is pulled into a pistol, which is fed with oxygen and a combustible gas under pressure, and also with compressed air, and minute particles of the wire are projected from the melting end in the form of spray. Practically any metal available in wire form and fusible in the oxy-hydrogen flame may be sprayed on to practically any surface—paper, fabric, wood, or metal. The surface produced is always matte, but may be polished if desired. The matte surface is an ideal foundation for paints. Considerable technical experience has now been obtained, and completed structures are being uniformly coated all over with any desired metal for protection against atmospheric corrosion, chemical attack, or furnace conditions. The process has also been used for building up repair and salvaging operations.

In France and Germany the process is being used in shipping work, and for the protection of overhead transmission line poles and wireless masts for big stations. In Great Britain it is being employed for the protection of certain portions of ships and for propellers.

Germany's Industrial Revival

IN an article in *Chemical and Metallurgical Engineering*, Mr. E. J. Mehren, vice-president of the McGraw-Hill Co., Inc., reviews the present-day conditions in Germany from a critical business standpoint. Germany, he says, has worked a financial miracle since last November, and no nation that shows Germany's potential strength can be permanently kept down or crushed. Under the Versailles treaty, or as a result of it, Germany lost many iron and coal deposits, her colonies, foreign investments, and export organisation. To these calamities must be added the occupation of the great industrial district of the Ruhr and a wrecked currency. But to-day Germany is a nation that is sure to be an important factor in the world's industry. Germany, of course, is not yet out of difficulty. The severest industrial handicap is lack of credit. To-day the credit resources of the banks is estimated at one-tenth of the pre-war amount. There is a terrific money shortage, but wages are at approximately pre-war level. Unemployment, while fairly great at present, is not as large as that of Great Britain, and does not present the all-important problem in Germany that it does here. Hours of work are increasing, and the coal supply is now more than ample owing to large development of lignite deposits.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at sellers' works.

General Heavy Chemicals

Acid Acetic 40% Tech.—£23 10s. per ton.

Acid Boric, Commercial.—Crystal, £45 per ton. Powder, £47 per ton

Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.

Acid Nitric 80° Tw.—£21 10s. to £27 per ton, makers' works according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.

Bleaching Powder.—Spot, £11 d/d.; Contract, £10 d/d. 4 ton lots.

Bisulphite of Lime.—£7 per ton, packages extra.

Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chloride.—£5 17s. 6d. per ton d/d.

Copper Sulphate.—£25 per ton.

Methylated Spirit 64 O.P.—Industrial, 3s. 1d. to 3s. 5d. per gall. Mineralised, 4s. 2d. to 4s. 6d. per gall., in each case according to quantity.

Nickel Sulphate.—£38 per ton d/d. Normal business.

Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate.—5½d. per lb.

Potassium Chlorate.—3d. to 4d. per lb.

Salammoniac.—£32 per ton d/d.

Salt Cake.—£3 10s. per ton d/d.

Soda Caustic, Solid.—Spot lots delivered, £16 7s. 6d. to £19 7s. 6d. per ton, according to strength; 20s. less for contracts.

Soda Crystals.—£5 5s. to £5 10s. per ton ex railway depots or ports.

Sodium Acetate 97/98%.—£24 per ton.

Sodium Bicarbonate.—£10 10s. per ton carr. paid.

Sodium Bichromate.—4½d. per lb.

Sodium Bisulphite Powder 60/62%.—£18 to £19 per ton according to quantity, f.o.b., 1-cwt. iron drums included.

Sodium Chlorate.—3d. per lb.

Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.

Sodium Nitrite 100% basis.—£27 per ton d/d.

Sodium Sulphide conc. 60/65.—About £14 10s. per ton d/d.

Sodium Sulphide Crystals.—£9 per ton d/d.

Sodium Sulphite, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—6½d. per lb. Quiet. Crude 60's, 1s. 9d to 1s. 11d. per gall., according to district. Still quiet.

Acid Cresylic 97/99.—2s. to 2s. 1d. per gall. Demand fair. Pale 95%, 1s. 9d. to 2s. per gall. Fair demand. Dark, 1s. 9d. to 2s. per gall. Quiet.

Anthracene Paste 40%.—4d. per unit per cwt. Nominal price. No business.

Anthracene Oil, Strained.—6½d. to 7½d. per gall. Quiet. Unstrained, 7d. to 7½d. per gall.

Benzol.—Crude 65's.—7½d. to 9d. per gall., ex works in tank wagons. Standard Motor, 1s. 1½d. to 1s. 3d. per gall., ex works in tank wagons. Pure, 1s. 5½d. to 1s. 7d. per gall., ex works in tank wagons.

Toluol.—90%, 1s. 5d. to 1s. 5½d. per gall. Pure, 1s. 8d. to 2s. per gall.

Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.

Creosote.—Cresylic, 20/24%, 8½d. per gall. Not much business. Middle Oil, Heavy, Standard specification, 5½d. to 6d. per gall., according to quality and district. Small export inquiry. Fair demand.

Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 11d. to 1s. 5d. per gall., according to district. Fair demand. Solvent 90/190, 11d. to 1s. 4d. per gall. Fair demand.

Naphthalene Crude.—Market dull. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £4 to £6 per ton. Quiet. Whizzed or hot pressed, £7 to £9 per ton.

Naphthalene.—Crystals and Flaked, £13 to £16 per ton in Yorkshire and London respectively.

Pitch.—Medium soft, 55s. to 60s. per ton, f.a.s. for next season. Frequent inquiries.

Pyridine.—90/160, 19s. per gall. Again dearer. Market firm. Heavy, 12s to 12s. 6d. Little business.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.

Acid H.—4s. per lb. 100% basis d/d.

Acid Naphthionic.—2s. 4d. per lb. 100% basis d/d.

Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.

Acid Salicylic, technical.—1s. 1d. per lb. Improved demand.

Acid Sulphanilic.—9½d. per lb. 100% basis d/d.

Aluminium Chloride, anhydrous.—1s. per lb. d/d.

Aniline Oil.—7¾d. to 8½d. per lb. naked at works.

Aniline Salts.—7¾d. to 9d. per lb. naked at works.

Antimony Pentachloride.—1s. per lb. d/d.

Benzidine Base.—4s. 6d. per lb. 100% basis d/d.

Benzyl Chloride 95%.—1s. 1d. per lb.

***p*-Chlorphenol.**—4s. 3d. per lb. d/d.

***p*-Chloraniline.**—3s. per lb. 100% basis.

***o*-Cresol 19/31° C.**—4½d. per lb. Demand steady.

***m*-Cresol 98/100%.**—2s. 1d. to 2s. 3d. per lb. Demand moderate.

***p*-Cresol 32/34° C.**—2s. 1d. to 2s. 3d. per lb. Demand moderate.

Dichloraniline.—2s. 3d. to 3s. per lb.

Dichloraniline S. Acid.—2s. 6d. per lb. 100% basis.

***p*-Dichlorbenzol.**—£85 per ton.

Diethylaniline.—4s. 6d. per lb. d/d., packages extra, returnable.

Dimethyaniline.—2s. 3d. per lb. d/d. Drums extra.

Dinitrobenzene.—9d. per lb. naked at works.

Dinitrochlorbenzol.—£84 10s. per ton d/d.

Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.

Diphenylaniline.—2s. 10d. per lb. d/d.

Monochlorbenzol.—£63 per ton.

***B*-Naphthol.**—1s. 1d. per lb. d/d.

***a*-Naphthylamine.**—1s. 4d. per lb. d/d.

***B*-Naphthylamine.**—4s. per lb. d/d.

***m*-Nitraniline.**—4s. 9d. per lb. d/d.

***p*-Nitraniline.**—2s. 3½d. per lb. d/d.

Nitrobenzene.—5½d. to 5¾d. per lb. naked at works.

***o*-Nitrochlorbenzol.**—2s. per lb. 100% basis d/d.

Nitronapthalene.—10½d. per lb. d/d.

***p*-Nitrophenol.**—1s. 9d. per lb. 100 % basis d/d.

***p*-Nitro-*o*-amido-phenol.**—4s. 6d. per lb. 100% basis.

***m*-Phenylene Diamine.**—4s. per lb. d/d.

***p*-Phenylene Diamine.**—10s. 3d. per lb. 100% basis d/d.

R. Salt.—2s. 6d. per lb. 100% basis d/d.

Sodium Naphthionate.—2s. 3d. per lb. 100% basis d/d.

***o*-Toluidine.**—8½d. per lb.

***p*-Toluidine.**—3s. 3d. per lb. naked at works.

***m*-Toluylene Diamine.**—4s. 3d. per lb. d/d.

Wood Distillation Products

Acetate of Lime.—Brown, £12 to £12 5s. per ton d/d. Grey, £17 to £18 per ton. Market easier. Liquor, 9d. per gall. 32° Tw.

Charcoal.—£7 10s. to £9 per ton, according to grade and locality. Demand fairly good.

Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.

Red Liquor.—10d. to 1s. per gall. 14/15° Tw.

Wood Creosote.—2s. 7d. per gall. Unrefined.

Wood Naphtha, Miscible.—4s. 10d. to 5s. per gall. 60% O.P. Market dull. Solvent, 5s. 6d. per gall. 40% O.P. Fairly good demand.

Wood Tar.—£4 per ton. Cheaper.

Brown Sugar of Lead.—£44 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 5¾d. to 1s. 4d. per lb., according to quality. Crimson, 1s. 3d. to 1s. 6d. per lb., according to quality.

Arsenic Sulphide, Yellow.—1s. 11d. per lb.

Barytes.—£3 10s. to £6 15s. per ton, according to quality.

Cadmium Sulphide.—3s. 9d. to 4s. per lb., according to quantity.

Carbon Bisulphide.—£30 to £33 per ton, according to quantity. Again dearer.

Carbon Black.—7d. to 7½d. per lb., ex-wharf. Dearer.

Carbon Tetrachloride.—£60 to £65 per ton, according to quantity, drums extra. Again dearer.

Chromium Oxide, Green.—1s. 3d. per lb.

Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.

Lamp Black.—£48 per ton, barrels free.

Lead Hyposulphite.—7½d. per lb.

Lithopone, 30%.—£22 10s. per ton.

Mineral Rubber "Rubpron."—£16 5s. per ton f.o.r. London.

Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—4d. per lb., carboys extra. Dearer.
Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s. 1d. per lb. Dearer.
Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality.

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£47 per ton.
Acid, Acetyl Salicylic.—3s. to 3s. 3d. according to quality.
Acid, Benzoic B.P.—3s. to 3s. 6d. per lb.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4½d. to 1s. 5d. per lb., less 5% for ton lots. Market very weak.
Acid, Gallic.—3s. per lb. for pure crystal.
Acid, Pyrogallic, Crystals.—6s. 9d. per lb. for 1 cwt. lots. Market firm. Increasing demand.
Acid, Salicylic.—1s. 6d. to 1s. 9d. per lb. Demand rather easier.
Acid, Tannic B.P.—3s. per lb. Market quiet.
Acid, Tartaric.—1s. 1½d. per lb., less 5%.
Amidol.—9s. per lb. d/d.
Acetanilide.—2s. 1d. to 2s. 3d. per lb. for quantity. Demand slow.
Amidopyrin.—13s. 3d. per lb. Neglected. Stocks low.
Ammonium Benzoate.—3s.3d. to 3s.6d. per lb. according to quantity.
Ammonium Carbonate B.P.—£37 per ton.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—15s. to 15s. 6d. per lb. Quiet market.
Benzonaphthol.—5s. 3d. per lb. Small inquiry.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—10s. 6d. to 12s. 6d. per lb.
Bismuth Citrate.—10s. 3d. to 12s. 3d. per lb.
Bismuth Salicylate.—9s. 0d. to 11s. 0d. per lb.
Bismuth Subnitrate.—9s. 8d. to 10s. 8d. per lb.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 2d. to 1s. 5d. per lb.; sodium, 1s. 3d. to 1s. 6d. per lb.; ammonium, 1s. 4d. to 1s. 7d. per lb. Market firm and Continental prices fully maintained with upward tendency.
Calcium Lactate—1s. 7d. to 1s. 9d. according to quantity. Fair demand and steady market.
Chloral Hydrate.—4s. to 4s. 3d. per lb. Very firm and scarce.
Chloroform.—2s. per lb. for cwt. lots. Very steady.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£54 per ton, ex works. English make in casks. About 8s. per cwt. extra for carboys.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—10s. 6d. to 11s. 3d. per lb.
Hexamine.—3s. 6d. per lb. for English make. Market quiet and steady.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb. for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—2s. 1d. to 2s. 5d. per lb., according to quantity.
Magnesium Carbonate.—Light Commercial, £36 per ton net.
Magnesium Oxide.—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 1s. 6d. to 2s. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 57s. 6d. per lb. Market rising rapidly. Synthetic, 26s. to 35s. per lb., according to quantity. English make. Strong demand.
Mercurials.—Market very quiet. Red oxide, 5s. 3d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 6d. to 3s. 7d. per lb.; white precipitate, 4s. 7d. to 4s. 8d. per lb.; Calomel, 3s. 11d. to 4s. per lb.
Methyl Salicylate.—1s. 10d. to 2s. 1d. per lb. Keen competition.
Methyl Sulphonel.—26s. per lb.
Metol.—11s. per lb. British make.
Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 10½d. to 3s. per lb. Not very active.
Paraldehyde.—1s. 5d. to 1s. 6d. per lb. in free bottles and cases.
Phenacetin.—6s. to 6s. 3d. per lb. Price and demand steady.
Phenazone.—7s. 6d. A shade firmer. Forward prices higher.
Phenolphthalein.—6s. 6d. per lb. Ample supplies.
Potassium Bitartrate 99/100% (Cream of Tartar).—88s. per cwt. less 2½% for ton lots. Firm market. Prices have upward tendency.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb. Dearer.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Good steady demand.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Keen competition keeps prices low.
Quinine Sulphate.—2s.3d. to 2s. 4d. per oz., in 100 oz. tins. Good market.
Resorcin.—5s. 2d. per lb.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s. 6d. per lb.
Silver Proteinate.—9s. 6d. per lb.
Sodium Benzoate, B.P.—2s. 9d. per lb. Ample supplies B.P. quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton. according to quantity, d/d. consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb. Less for quantity.
Sodium Potassium Tartrate (Rochelle Salt).—75s. to 82s. 6d. per cwt., according to quantity. Market steady, good demand.
Sodium Salicylate.—Powder, 2s. to 2s. 3d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb. Flake, 2s. 9d. per lb. Market rather easier.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb., according to quantity.
Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity, 1 cwt. kegs included. In large casks £1 per ton less.
Thymol.—20s. per lb. Nominal. Very scarce indeed.

Perfumery Chemicals

Acetophenone.—12s 6d. per lb.
Aubepine.—15s. 3d. per lb. Advanced.
Amyl Acetate.—2s. 6d. per lb. Cheaper.
Amyl Butyrate.—6s. 9d. per lb.
Amyl Salicylate.—3s. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 9d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 9d. per lb.
Benzaldehyde free from Chlorine.—3s. 6d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—16s. per lb. Advanced.
Coumarin.—19s. 6d. per lb. Cheaper.
Citronellol.—17s. per lb. Again advanced.
Citral.—8s. 6d. per lb. Cheaper. Price reduction due to selling competition.
Ethyl Cinnamate.—12s. 6d. per lb. Cheaper.
Ethyl Phthalate.—3s. 3d. per lb.
Eugenol.—10s. 6d. per lb. Cheaper.
Geraniol (Palmarosa).—35s. per lb.
Geraniol.—11s. to 18s. 6d. per lb.
Heliotropine.—7s. 3d. per lb.
Iso Eugenol.—15s. 9d. per lb.
Linalol ex Bois de Rose.—26s. per lb.
Linalyl Acetate.—26s. per lb.
Methyl Anthranilate.—9s. 6d. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—45s. per lb. Cheaper.
Musk Xylol.—14s. per lb. Again cheaper.
Nerolin.—4s. 9d. per lb. Advanced.
Phenyl Ethyl Acetate.—15s. per lb. Advanced.
Phenyl Ethyl Alcohol.—16s. per lb.
Rhodinol.—60s. per lb. Advanced.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 4d. per lb. Cheaper.
Vanillin.—26s. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—15s. 6d. per lb.
Anise Oil.—2s. 6d. per lb. Cheaper.
Bergamot Oil.—17s. 6d. per lb. Again firmer.
Bourbon Geranium Oil.—36s. per lb.
Camphor Oil.—65s. per cwt.
Cananga Oil, Java.—10s. 6d. per lb.
Cinnamon Oil, Leaf.—6½d. per oz.
Cassia Oil, 80/85%.—10s. per lb. Advanced.
Citronella Oil.—Java, 85/90%, 5s. 8d. per lb. Ceylon, 3s. 7d. per lb.
Clove Oil.—7s. 6d. per lb. Cheaper.
Eucalyptus Oil, 70/75%.—2s. 3d. per lb. Advanced.
Lavender Oil.—French 38/40% Esters, 27s. 6d. per lb. Cheaper.
Lemon Oil.—3s. per lb.
Lemongrass Oil.—3d. per oz.
Orange Oil, Sweet.—11s. per lb.
Otto of Rose Oil.—Bulgarian, 37s. 6d. per oz. Production below normal. Anatolian, 18s. per oz.
Palma Rosa Oil.—17s. per lb. Cheaper.
Peppermint Oil.—Wayne County, 27s. per lb. Firm spot and forward. Japanese, 17s. 6d. per lb. Market very active and prices rising.
Petitgrain Oil.—9s. 3d. per lb.
Sandal Wood Oil.—Mysore, 26s. 7d. per lb. Australian, 21s. per lb

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, September 11, 1924.

DURING the past week business in the heavy chemical market has been rather quieter, inquiries received being in nearly all cases for small quantities. With the settlement of the Reparations question, advised last week, continental offers are becoming more numerous and prices for some products are easier. There is, however, no change of importance to record.

Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £57 to £67 per ton; 80% pure, £44 to £46 per ton; 80% technical, £43 to £45 per ton. All packed in casks delivered c.i.f. U.K. ports, duty free.

ACID BORACIC.—Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Very little inquiry. Price quoted 6¼d. per lb. delivered.

ACID CITRIC, B.P. CRYSTALS.—Nominally 1s. 4½d. per lb., less 5% ex store, but could probably be obtained for less.

ACID FORMIC, 85%.—Unchanged at about £55 10s. per ton, ex store, spot delivery. Offered from the continent at about £53 per ton, ex wharf.

ACID HYDROCHLORIC.—In little demand, price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Now quoted 4d. per lb., ex station, early delivery. Spot material about ¼d. per lb. more.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Spot material now quoted 1s. 0½d. per lb., less 5%, ex store.

ALUMINA SULPHATE, 17/18%, IRON FREE.—Unchanged at about £8 per ton, ex store. Quoted £7 5s. per ton, c.i.f. U.K. port, prompt shipment.

ALUM.—Ammonium chrome alum on offer at £17 to £19 per ton, according to quality, f.o.b. U.K. port for export. Lump potash alum quoted £9 12s. 6d. per ton, ex store, spot delivery. Offered for prompt shipment from the continent at about £8 7s. 6d. per ton, c.i.f. U.K. port.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton; packed in 5 cwt. casks, delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantity; containers extra.

AMMONIA MURIATE.—Grey galvanisers quality unchanged at £30 per ton, ex station, fine white crystals of English manufacture quoted £37 per ton, f.o.b. U.K. port; fine white crystals offered from the continent at £24 10s. per ton, c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—Spot lots unchanged at about £51 to £52 per ton, ex store, quoted £47 per ton, f.o.b. U.K. port for export.

BARIUM CARBONATE, 98/100%.—Quoted £11 12s. 6d. per ton, c.i.f. U.K. port, 97/99% quality 14s. per ton less.

BARIUM CHLORIDE, 98/100%.—Unchanged at about £14 per ton, ex store, spot delivery. Offered from the continent at about £13 per ton, c.i.f. U.K. port.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station, contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station, continental on offer at £4 17s. 6d. per ton, c.i.f. U.K.

COPPERAS, GREEN.—Unchanged at about £3 per ton, ex works, packed in casks, free.

COPPER SULPHATE.—Quoted £24 per ton, f.o.b. U.K. port for export. Continental material on offer at £23 5s. per ton, ex quay.

FORMALDEHYDE, 40%.—Spot lots unchanged at £53 10s. per ton, ex store. Offered for prompt shipment from America at £50 per ton, c.i.f. U.K. port.

GLAUBER SALTS.—English material quoted £4 per ton, ex store or station. Fine white crystals offered from the continent at £3 5s. per ton, c.i.f. U.K. port. Large crystals 10s. per ton extra.

LEAD, RED.—Imported material on offer at £41 per ton, ex store, spot delivery.

LEAD, WHITE.—Quoted £44 per ton, ex store, spot delivery.

LEAD ACETATE.—Refined white crystals quoted £44 10s. per ton, c.i.f. U.K. port; brown on offer at £40 per ton, c.i.f. U.K. port. Spot quotations about £1 per ton higher.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton. ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Spot lots now quoted £4 12s. 6d. per ton, ex store. On offer from the continent at about £4 5s. per ton, c.i.f. U.K. port.

POTASH CAUSTIC, 88/92%.—Quoted £29 per ton, c.i.f. U.K. port. Spot lots on offer at about £30 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5½d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Quoted £22 10s. per ton, c.i.f. U.K. port. Spot lots available at about £25 per ton, ex store; 90/94% quality on offer at about £20 15s. per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—Offered for prompt shipment from the continent at about 2¾d. per lb., ex wharf. Spot lots quoted 3d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Quoted £28 15s. per ton, ex store, spot delivery. On offer from the continent at about £26 per ton, c.i.f. U.K. port.

POTASSIUM, PERMANGANATE, B.P. CRYSTALS.—Quoted 8½d. per lb., ex store. Commercial quality on offer at 6½d. per lb., ex wharf, prompt shipment from the continent.

POTASSIUM PRUSSIATE (YELLOW).—In little demand. Quoted 7¼d. per lb., ex store.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station, spot delivery, contracts 20s. per ton less.

SODIUM ACETATE.—Spot material now quoted £23 10s. per ton, ex store. Offered for prompt shipment from the continent at about £22 15s. per ton, ex wharf.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station, M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4¼d. per lb. delivered.

SODIUM CARBONATE, SODA CRYSTALS.—£5 per ton to £5 5s. per ton, ex quay or station. Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material quoted £10 per ton ex station. Rather cheaper offers from the continent. Now quoted £8 5s. per ton c.i.f., U.K. ports. Spot lots on offer at about £9 15s. per ton, ex store. Pea crystals of English manufacture unchanged at £13 15s. per ton, ex station.

SODIUM NITRATE.—Ordinary quality unchanged at £13 10s. per ton, ex store. 96/98%, refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—In little demand. Spot material quoted £26 5s. per ton, ex store.

SODIUM PRUSSIATE, YELLOW.—In little demand. Quoted 4¼d. per lb., ex station, or f.o.b. U.K. port.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption £3 10s. per ton, carriage paid buyer's station. Good inquiry for export and price about £3 per ton f.o.b. U.K. port.

SODIUM SULPHIDE.—60/65%, solid, of English manufacture, £14 15s. per ton, ex station; broken, £1 per ton more; flake, £2 per ton more; 60/62% solid, offered from the continent at £12 10s. per ton c.i.f. U.K. port; broken, £1 2s. 6d. per ton extra; 31/34%, crystals of English manufacture, £9 2s. 6d. per ton, ex station. 30/32%, crystals offered from the continent at £8 12s. 6d. per ton. c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton, ex store. Prices nominal.

ZINC CHLORIDE, 98/100% SOLID.—Offered from the continent at about £24 5s. per ton, c.i.f. U.K. port. 96/98% quoted £23 10s. per ton c.i.f. U.K. port. English material for export about £27 5s. per ton, f.o.b. U.K. port.

ZINC SULPHATE.—Spot lots of continental material available at £11 10s. per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Moderate demand. Price 1s. 4d. per lb. delivered.

BENZALDEHYDE.—Good home inquiry. Price 2s. 1d. per lb. delivered.

BENZIDINE BASE.—Small home demand. Price 3s. 10d. per lb. 100% basis.

BETA NAPTHOL.—Considerable inquiry. Price 1s. per lb., carriage paid.

CHLOR ANISIDINE.—Some export inquiry. Price 6s. per lb. f.o.b.

CHROMOTROPE ACID.—Some export inquiry. Price 6s. 4d. per lb., 100% basis, f.o.b.

DI ETHYLAMINE BASE.—Is offered in small lots at 17s. per lb., carriage paid.

DIMETHYLANILINE.—Small home inquiries. Price 2s. 3d. per lb. delivered.
DI NITROTOLUOL.—Price remains firm at 10d. per lb., carriage paid or f.o.b.
H ACID.—Small export inquiry. Price 3s. 11d. per lb., 100% basis, f.o.b.
META NITRANILINE.—Some home inquiry. Price 4s. per lb. delivered.
META TOLUYLENE DIAMINE.—Good home inquiry. Price 4s. per lb. delivered.
NAPHTHIONIC ACID.—Considerable home inquiry. Price 2s. 2d. per lb., 100% basis.
ORTHO AMIDOPHENOL.—Home inquiry. Price 10s. per lb., 100% basis, carriage paid.
ORTHO NITRO ANISOL.—Some export inquiry. Price 5s. per lb. f.o.b.
PARA PHENYLENE DIAMINE.—Small home inquiry. Price 11s. 6d. per lb. delivered.
TOBIAS ACID.—Fair home demand. Price 4s. 9d. per lb., 100% basis, delivered.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT)

Manchester, September 11, 1924.

THE chemical market here this week has been in much the same position as during the last month or two and although the feeling is rather more cheerful than for some time this so far has been reflected in little, if any, increase in business. Home trade buyers are confining themselves to filling immediate needs, bookings for forward delivery being on a very small scale. Export business is only moderate and mainly for the colonies and India, with small parcels for the Continent.

Heavy Chemicals

Prussiate of soda still sells rather slowly although current values are unchanged at about 4d. per lb. Both saltcake and glauber salts are attracting little attention, either from home users or for export; in each case the quotations remains at round £3 10s. per ton. Hyposulphite of soda is quiet but fairly steady; photographic crystals are still quoted at £14 to £14 5s. per ton and commercial quality at about £9 15s. Caustic soda keeps very steady at from £16 17s. 6d. per ton for 60 per cent. strength to £19 7s. 6d. for 76–77 per cent. material; a fair amount of trade is being put through both on home and export account. Soda crystals are about unchanged at £5 5s. but the demand continues on a rather restricted scale. Sulphide of sodium is quiet but steady at £14 10s. to £15 per ton for 60–65 per cent. concentrated solid and £9 10s. per ton for crystals. Bleaching powder is in comparatively small request at £10 per ton. Acetate of soda is inactive and rather easier at round £22 per ton. Alkali meets with a quietly steady demand for both branches of trade and the quotation is maintained at £6 15s. per ton. Chlorate of soda is in moderate inquiry at 2½d. to 2¾d. per lb. Bicarbonate of soda is unchanged at round £10 10s. per ton, but the demand is slow. Phosphate of soda is still on offer at £13 10s. to £14 per ton. Bichromate of soda is steady and in fair demand at 4¼d. per lb.

Caustic potash is held at last week's level of £29 per ton for 90 per cent. strength, and attracts a moderate amount of attention. Carbonate of potash is rather quiet and easy at about £22 10s. per ton. Yellow prussiate of potash is selling only in small quantities, with values ranging from 7d. to 7¼d. per lb. Chlorate is steady and in fair inquiry at 2¾d. per lb., with bichromate of potash in much the same position at 5½d. per lb. Permanganate of potash is only in quiet demand, though prices are at about the same level as last week, namely, 6¾d. to 7¼d. per lb., according to quality.

The demand for arsenic continues on a very restricted scale, with white powdered, Cornish makes, on offer in Manchester at about £48 per ton. Sulphate of copper has rather an easy tendency at about £24 10s. per ton, f.o.b., no improvement in the position having taken place. Commercial Epsom salts are steady and in fair inquiry at £4 10s. to £4 15s. per ton, with magnesium sulphate, B.P. quality, still quoted at round £6 10s. per ton. The demand for acetate of lime keeps quiet and values are a shade easier at £16 per ton for grey and £11 for brown. Nitrate of lead is maintained at £41 to £42 per ton, but business is on a small scale. Acetate of lead is in fair request, with white at £46 and brown at £43 10s. per ton.

Acids and Coal Tar Products

In almost every case the commodities in these groups are quiet indeed and in some instances values have a distinctly weak tendency. Tartaric acid is in small demand at about 1s. 1d. per lb. Citric acid is similarly situated, values in this case ranging from 1s. 4½d. to 1s. 5d. per lb. Oxalic acid is quiet and easy at round 4d. per lb. Acetic acid is only in moderate demand at from £42 to £43 per ton for 80 per cent. commercial and about £68 per ton for glacial.

The demand for pitch is on a restricted scale, with quotations more or less nominal at £2 15s. per ton, Manchester. Carbolic acid is about unchanged at 6¼d. per lb. for crystal and 1s. 10d. per gallon for crude, but little trade is being done. Creosote oil is offering at round 5¾d. per gallon. Solvent naphtha is still quiet and easy at 1s. 2d. per gallon. Naphthalenes are fairly steady at £16 per ton for refined and from £5 per ton for crude qualities, though the actual demand is small.

Hamburg Oils and Fats Market

THE Department of Overseas Trade has received in a communication from Hamburg the following details taken from a report by C. H. Stöber, of Hamburg, dated September 5:—

The markets have remained firm although prices have not risen generally. Purchases chiefly consisted of parcels which were immediately available.

LINSEED OIL was inclined to be quiet at the end of last week, but closed firmer, on account of the altered condition of the seed. Prompt delivery was scarce as before. Dutch spot c.i.f., 53 Dutch florins; Harburg prompt, 55 Dutch florins; Dutch September delivery 50 Dutch florins; Dutch September-December delivery 49.50 Dutch florins.
SOYA BEAN OIL remained firm. Manchurian spot, £46.
PALM KERNEL OIL.—Owing to an increase in demand prices rose a little. British in casks £48, German £48.
COCOANUT OIL has hardly changed since the previous week. The firm tendency is expected to continue. Crude wax 3 per cent. free fatty acid, 58.50 Dutch florins, Ceylon f.a.q. spot, £50.
SULPHUR OLIVE OIL.—Prompt c.i.f. Hamburg, 530 lire.
CASTOR OIL.—Interest in this article has decreased on account of the present high prices; 1st expression, prompt delivery, Hull, £73; 2nd expression, £71 10s.
COTTON SEED OIL.—Little was done. Prices unaltered. Prompt delivery United Kingdom, £49 10s.
FATTY ACIDS.—Inland mills have raised their prices. Cocoanut oil fatty acid was in demand, with scanty offers.
RESIN.—Market continued firm and prices to rise.
LINSEED OIL (HARBURG), 54 Dutch florins; varnish, 56 Dutch florins; fatty acid, 59 Dutch florins.
COCOANUT OIL, £48; fatty acid, £42.
LAGOS PALM OIL, £42.
BONE FAT, £39 10s.
PALM KERNEL OIL, £47; fatty acid, £42.
COTTON SEED OIL.—Clear, £48 10s.
CASTOR OIL.—1st expression, £72 10s.; 2nd expression, £71 10s.
SOYA BEAN OIL, CRUDE.—£45 10s.
SULPHUR OIL, ITALIAN.—530 lire.
TURPENTINE OIL, AMERICAN.—$34.50.
COD LIVER OIL.—Light clear, £36 10s.; yellow, £34 10s.; brown, £33 10s.
BROWN TRAIN.—£30 10s.

(Sterling quotations are per 1,000 kgs, those in Dutch florins and U.S.A. dollars are per 100 kgs.).

SHELLAC.—T.N. orange, G.M.6.90; lemon, G.M.7.90 (per kg. excluding packing).
BONE GLUE.—G.M. 78.
LEATHER GLUE, G.M. 93.50.
RESIN.—American, medium clear.—$6.

Company News

UTAH COPPER CO.—A dividend of $1 per share has been declared payable on September 30.

BOOTS PURE DRUG CO.—The usual quarterly dividend at the rate of 36 per cent. per annum is announced, payable on October 1.

BRITISH ALUMINIUM CO., LTD.—The directors announce a dividend at the rate of 5 per cent. per annum, less tax, on the ordinary shares for the six months ended June 30 last, payable on October 1.

AMERICAN CYANAMID CO.—A dividend is announced of $1½ per share on the preferred stock, and $1 per share, plus $½ extra on the common stock, payable on October 2 to holders registered on September 16.

BRITISH BORNEO PETROLEUM SYNDICATE, LTD.—An interim dividend of 5 per cent., less tax, is announced, payable on September 25. The transfer books will be closed from September 10 to 24, inclusive, for the preparation of dividend warrants.

TIMBER FIREPROOFING CO.—The report for the year ended March 31 last says that the reorganisation of the business has been carried out, that the woodworking and manufacturing side of the business has been discontinued and the stock is in process of liquidation. After charging £8,957 to depreciation a debit balance is shown of £10,243. The balance-sheet contains no profit and loss account and the cash in hand is returned at £4 2s. 4d. A very large order for fireproofing material for use by the Imperial Japanese Navy has been received which will occupy the company's plant for some months.

THE UNITED INDIGO AND CHEMICAL CO., LTD.—At a meeting of the directors held on September 5, it was decided to recommend payment of the following dividends forthwith, viz.: 5 per cent. per annum for the six months ended June 30, 1924, on the ordinary shares subject to income tax at 4s. 6d. in the £; a further dividend of 10 per cent., less income tax at 4s. 6d. in the £ on the ordinary shares, making 15 per cent. for the year ended June 30, 1924; also a further dividend of 10 per cent., less income tax at 4s. 6d. in the £ on the preference shares, making 15 per cent. for the year ended June 30, 1924; and that the transfer books of the company be closed from September 8 to September 17 inclusive. The dividends will be payable on September 19. The annual meeting will be held at 60, Spring Gardens, Manchester, on Wednesday, September 17, at 11 a.m.

NOBEL INDUSTRIES, LTD.—The report for the year ended December 31 last states that the profit was £1,178,443. After providing £112,977 note and debenture interest and writing off £30,000 premium payable on redemption of the 8 per cent. notes, the balance at credit of profit and loss is £1,035,466. Deducting £2,977, the amount required to write off one-thirtieth of the cost of debenture issue, and adding £509,018, amount brought in, the balance is £1,541,507. A dividend on the 6 per cent. preference shares has already been paid for the six months to June 30, 1923, and the directors now recommend a further dividend on the preference shares for the half-year to December 31 last, and dividend on the ordinary shares for the year at the rate of 8 per cent. per annum (less tax), leaving an available balance of £750,130. The annual meeting will be held at Winchester House, London, E.C., on September 19, at 12.30 p.m.

Tariff Changes

CANADA.—Stearic acid when imported by manufacturers, for use only in their own factories in the manufacture of candles, is now free of duty of Customs.

NETHERLAND EAST INDIES.—The rate of import duty on chloralhydrate, sulphuric ether, chloroform, collodion and other similar products prepared from or with ethyl, amyl, butyl, and propyl or methyl alcohols is now 12 per cent. *ad valorem*. Another rate of duty, however, may be fixed by the Governor-General, based on the tax levied on the import of alcohol from or with which they are prepared.

FRENCH GUIANA.—The following articles are removed from the Special Tariff of French Guiana :—Spiegeleisen, containing from 15 to 25 per cent. of manganese, sulphide of carbon. These articles will now pay the corresponding duties of the French "Minimum" Tariff.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C. 2, from whom further information can be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs. Opposition to the Registration of the following Trade Marks can be lodged up to October 10, 1924.

"ALDA."

447,354. For dissolved acetylene, that is to say, acetylene compressed into a porous substance for storage purposes. Allen-Liversidge, Limited, 106, Victoria Street, London, S.W.1, manufacturers. April 10, 1924. (To be Associated. Sect. 24.)

"BELLAFOLINE."

449,790. For chemical substances prepared for use in medicine and pharmacy. Society of Chemical Industry in Basle (a Joint Stock Company organised under the laws of the Swiss Republic), 141-227, Klybeckstrasse, Basle, Switzerland, manufacturers and merchants. July 1, 1924. (To be Associated. Sect. 24.)

"PERMADOL."

450,006. For composition paints. The British Anti-Fouling Composition and Paint Company, Limited, 130, Leadenhall Street, London, E.C.3, manufacturers. July 8, 1924.

"STREETCO."

450,332. For chemical substances used in manufactures, photography or philosophical research and anti-corrosives. Leslie Allan and Company (South Wales), Limited, Rainford Works, Rainford, Lancashire, refiners and distillers of petroleum and tar products. July 18, 1924. (To be Associated. Sect. 24.)

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

ACID TANK WAGONS.—The Directors of the East Indian Railway invite tenders, up to Wednesday, September 17, for acid tank vans. Specifications, one guinea, from the Company's offices, 73/6, King William Street, London, E.C.4. Fee not returnable.

COPPER, MERCURY AND SODA PRODUCTS, ANNATTO SEED AND PASTE.—A firm of importers and commission agents in Copenhagen desires to secure the representation for Denmark of British exporters of copper products (oxide, sulpho-cyanide and cyanide), mercury products, soda products (caustic soda and soda ash), annatto seed and annatto paste. (Reference No. 265.)

RED OXIDE PAINT IN PASTE.—The South African Railways and Harbours are inviting tenders, to be presented by October 13, 1924, for 95 tons each of 2,000 lb. of red oxide paint in paste (of British manufacture) for delivery at various South African railway stores. (Reference No. B.X./1225.)

CHEMICALS, CHEMICO-TECHNICAL, RUBBER AND SURGICAL GOODS.—A firm of commission agents in Warsaw desires to secure the Polish representation of British manufacturers of chemicals, chemico-technical, rubber and surgical goods.

ANTIFRICTION GREASE FOR SOUTH AFRICA.—The South African Railways and Harbours Stores Department are inviting tenders for the supply, delivered "free on rail" at the points mentioned, of such quantities of antifriction grease as may be required and ordered by the Administration during the period of 1st January, 1925, to 30th June, 1925. The approximate requirements total 24 tons (of 2,000 lbs.) to be delivered at various points. Tenders are to be presented at Johannesburg not later than noon on October 20. Firms in a position to offer British-made antifriction grease can obtain full particulars of the contract upon application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that occur.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

McLEOD (HULL), LTD., St. Andrew's Works, Mason Street, Hull, manufacturing chemists. (C.C., 13/9/24.) £16 15s. 9d. May 27.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

HASSALL AND CO., LTD., London, E., chemical manufacturers. (M., 13/9/24.) Registered August 15, £3,000 debentures; general charge.

TAYLORS' DRUG CO., LTD., Leeds. (M., 13/9/24.) Registered August 28, £2,000 mortgage and covenant to surrender, to Mrs. G. Ashworth, 5, Greek Street, Leeds, sol.; charged on property in Front Street, Chester-le-Street. *£104,858 13s. 10d. September 17, 1923.

Satisfaction

BANNER (SAMUEL) AND CO., LTD., Liverpool, chemical manufacturers. (M.S., 13/9/24.) Satisfaction registered August 30, all moneys, etc., registered August 24, 1920.

London Gazette, &c.

Partnership Dissolved

COKE AND MAXTED (Basil Elmsley COKE and Edward Bradford MAXTED, D.Sc. Lond.), chemists for the purpose of industrial research, Manor Road, Penn, Wolverhampton, by mutual consent as from July 11, 1924.

Bankruptcy Information

PEARSON, Ralph, Rutland Street Works, Middleton, Lancashire, trading as the Alpha Chemical and Finishing Co. cloth stiffener and finisher. First meeting, September 15, 3 p.m., Official Receiver's offices, Byrom Street, Manchester. Public examination, October 17, 10.30 a.m., Court House, Church Lane, Oldham.

Receivership

RECORD POLISH CO., LTD. (R., 13/9/24.) E. C. Gregson, of 44, Brown Street, Manchester, was appointed receiver on September 1, 1924, under powers contained in Second "A" mortgage debentures dated February 16, 1905.

No Election

In a letter to *The Times* Sir Ernest Benn makes "an earnest plea for no election." "Just as we are starting on a new winter's trade," he writes, "with some small hope of getting a little nearer to normal working habits, we are threatened again with the upheaval of a General Election, the third in three years. Commercial travellers will for months be defeated with the familiar and conclusive formula, 'After the election,' and business will be kept at that minimum which is all that is ever done with the cloud of a political upheaval hanging overhead. Other nations—all making more progress than ourselves—are free from this devastating risk. Could not we, the voters, find some way of making it known that we elected a Parliament last November for five years, and that we expect it to function for that period? One fact at least is certain and is worth emphasising, that any Prime Minister of any party who dissolves this Parliament until there is overwhelming evidence that the country wants a change will divest himself of the more responsible sections of his supporters."

New Companies Registered

AMOLIA CHEMICAL CO., LTD. Chemists, druggists, drysalters, oil and colourmen, etc. Nominal capital, £500 in 4,000 ordinary shares of 1s. each, and 300 "B" shares of £1 each. Solicitors: Walter Brook and Co., 2, Gresham Buildings, London, E.C.2.

BRITISH SULPHATE OF COPPER ASSOCIATION, LTD., 39, Victoria Street, Westminster, London, S.W.1. Registered on August 29 as a company limited by guarantee and not having a share capital, with an unlimited number of members, each liable in the event of winding up for not more than 10s. for every ton of sulphate of copper that shall have been produced or manufactured by such members during the year immediately preceding the date of the resolution or order to wind up the Association. For this purpose and for all purposes of the Association a ton of sulphate of copper shall mean 2·240 English lb. in weight. The objects are to act as agents for the sale of sulphate of copper at home and abroad; to import, export, insure, deal in and dispose of sulphate of copper, and act as agents for the sale and purchase of and provide storage accommodation for the same, etc. The general management and control is vested in a management committee, the first members of which are:—A. McKechnie, c/o McKechnie Bros., Ltd., Widnes, Lancs; S. M. Dennis, c/o J. H. Dennis and Sons, Ltd., 24, Chapel Street, Liverpool; D. O. Evans, c/o Mond Nickel Co., Ltd., 39, Victoria Street, S.W.1. Solicitors: Guedalla, Jacobson and Spyer, Winchester House, Old Broad Street, London, E.C.2.

JOHN BUCK AND SONS, LTD. Soap manufacturers. Nominal capital, £2,000 in £1 shares (500 preference and 1,500 ordinary). Solicitors: Batten and Whitsea, Peterborough.

RENELAC, LTD., Charlton Works, Charlton Place, Islington, London, N.1. Manufacturers, importers, exporters, extractors and refiners of and dealers in gums, shellac, lubricating oils, etc. Nominal capital, £1,000 in £1 shares.

SPOTS, LTD., 59/60, Eagle Street, Southampton Row, London, W.C.1. Chemists, druggists, drysalters, oil and colourmen, colour grinders, etc. Nominal capital, £100 in £1 shares.

THE PYROS CHEMICAL AND ENGINEERING CO., LTD. The registered address of this company is 29, New Bridge Street, London, E.C.4, not 59, as stated in our issue of August 30.

Chemical Products from Bones

To appreciate the potentialities of bone waste and the possibilities of its products in commerce and industry it is necessary to visit the exhibition at 19, Bedford Square, London, W.C.1, organised by British Glues and Chemicals, Ltd. This exhibition, which will probably continue open until the end of the year, has been arranged with the dual purpose of making public the numerous and highly useful products of bones, and to increase the supply of old bones, the present shortage of which necessitates the firm buying abroad.

The exhibits are arranged in sequential order and demonstrate the immense range of products already procured. Apart from the ordinary glues, gelatins, bone meals, fertilisers or cattle foods, it is interesting to note that direct products are used in candle making, soap making, and china stone making. Glycerin is also obtained.

A branch of research carried on by the firm is the analysis of cattle food contents and the production of a special steam boned flour which provides the difference between the chemical requirements necessary to healthy growth and the actual chemical constituents consumed in a normal feeding mixture. This mixture is claimed to be superior to the ordinary fish meal and has been shown by analysis to be perfectly safe from a chemical and bacteriological point of view. Its very low oil content prevents the production of oily meat, and no taint is produced, as is often the case when fish meal is used.